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DEVELOPMENTAL TRENDS IN THE STRUCTURE OF SMALL GROUPS

CHRISTOPH HEINICKE AND ROBERT F. BALES
Harvard University

It is a common observation that newly formed groups tend in the course of time to develop relatively stable patterns of interaction. The development of stability is by no means inevitable, however, as we are reminded by the cases of groups which disintegrate soon after formation, or continue for a long period in a state of inner turmoil. The course of structural development in new groups seems to depend not simply upon changes in conditions which are inevitably linked with time, but upon conditions which may be different from the very first, either in the original composition of the group or in the situation which they face.

In the present study[1] we attempt to develop a preliminary conception of some of the factors underlying structural change in small groups. The basic ideas grow out of experience in the observation of groups under laboratory conditions, out of deduction from findings we regard as already fairly well established, and out of inductive exploration of our data. The data reported include measures of various aspects of interaction and ratings of members by each other in a number of newly formed, "initially leaderless" discussion groups during a series of meetings under reasonably constant laboratory conditions. There was no experimental variation of external conditions, but rather an attempt to keep them as constant as possible. We find that groups formed in this fashion nevertheless show measurable differences in their very early structure. Whatever their source, these differences in initial structure seem to be associated with later differences in developmental trends.

As research becomes more refined one hopes to measure and take account of those factors which he cannot control. In setting up the groups we hoped that we would learn to make some useful distinctions as to

[1] The data at Northwestern University were collected by Christoph Heinicke as part of a basic research project supported by the Office of Naval Research and directed by Dr. Robert L. French. The authors would like to express their indebtedness to Dr. French and also to Carol Bell and Dr. Kermit Rhode who were members of the project. The Harvard study was facilitated by the Laboratory of Social Relations and supported by funds from The RAND Corporation, Santa Monica, California. For the work at Harvard we are particularly grateful for the stimulation and suggestions of Philip E. Slater, Research Assistant in the Laboratory of Social Relations.

structure types which we could measure and take into account, even if we could not control them. We hoped to get an idea of what "natural developmental trends" we would have to take into account in experimental designs that call for repeated meetings of groups. We hoped to provide some basis for deciding how long to hold groups together for given experimental purposes, and what types of observations we needed in order to assure ourselves that we had succeeded in setting up groups of the type we intended. Finally we hoped that the observations would assist us in formulating more precise hypotheses as to the factors related to structural development which we could subject to experimental control and variation.

Procedure

Since some groups were studied at Northwestern University, (4) and some at Harvard University, and since the procedures differed slightly, they will be described separately below.

Procedure at Northwestern

Subjects and Groups

Six groups of five subjects each were made up of male students in elementary psychology classes. At the time volunteers were called for, the classes were told that the object of the study was to ascertain the opinions of groups of undergraduates on a series of problems of psychological interest, that each group would meet at the same time once per week for six successive weeks, and that participation would satisfy the course requirement for service as an experimental subject. The final selection of subjects was then made essentially at random from those volunteers whose free period permitted their being scheduled with a group, and who did not know anyone already scheduled for the group.

Discussion Problems

At each session a group was given the task of discussing a problem of human relations and writing to the hypothetical protagonist a letter embodying its conclusions and recommendations. Six problems were used, a different one for each session of a group. Their order of presentation was partially counterbalanced for different groups by treating the problems as letters in a six-by-six Latin square.

Criteria governing the design of the problems were interest-value for students, and the presence of genuine value conflicts which would insure some disagreement and render impossible any solution with reference to objective factual standards. Earlier trials of the problems indicated that

they met both requirements. An abbreviated description of one of the problems follows:

> While overseas Allen has had an affair with an English girl, and feels obliged on his return to tell his wife; but he hesitates because of her strong feelings about infidelity. (Adapted from Deutsch (3).)

Instructions to Subjects

When members of a group had assembled in the experimental room for the first scheduled meeting, they were asked to seat themselves about a round table, and to put on different colored coats which would serve to identify them to one another. After some introductory remarks, mimeographed descriptions of the problem for that day were passed out, and the problem was read aloud by the experimenter. Subjects were then told that they would have 40 minutes in which to discuss the problem, arrive at agreement and write up their recommendations, and that they could not dispose of the problem by referring it to someone else, e.g. a psychiatrist. They were informed, further, that they were one of six groups who would be competing for a group prize. Each member of the group giving the best performance during the six week period would receive additional points toward his psychology grade and two dollars in cash. The subjects were told that evaluation of their performance would involve ratings of the written solutions with reference to completeness with which relevant considerations were taken into account, realism in assessing these, and cogency of expression.

The sessions were sound recorded and interaction was recorded by an observer behind a one-way mirror. The subjects were not told about the sound recording or the one-way mirrors. Presumably the only observations were made by the experimenter who remained in the room after giving the instructions.

At the end of the session subjects were asked to record their general impressions of the meeting, and to say nothing about the nature of the study to other people.

At subsequent meetings the initial procedure described above was progressively abbreviated. Following the final session, subjects filled out a questionnaire concerning various aspects of their experience. The nature of the experiment was then explained and discussed with them.

Status Rankings and Questionnaire Data

After each session the interaction observer and the experimenter who handled the groups ranked members of the group for leadership displayed during the session. The median correlation between the two observers for

the 36 sessions was .90. In a previous experiment involving 18 one-session groups, the members of each of which ranked one another for leadership immediately after the session, the rankings by the group had shown a median correlation of .90 with rankings given by the interaction observer. It seemed reasonable to conclude, therefore, that the latter's ranking would indicate reliably the way in which group members would rank each other if given the opportunity. This opportunity was not given during the first five sessions for fear the procedure might disturb the course of group development; but at the end of the sixth session the subjects did rank one another as a part of a longer questionnaire.

The questionnaire aimed to secure reactions of the subjects to the situation, as a possible basis for further insight into processes of group development. Interspersed among other questions were the following:

> Q. 8. Considering all six sessions, which member of the group would you say stood out most definitely as a leader in the discussion? How would you rank the others? Include yourself.
>
> Q. 14. Which member of the group did the most to guide the discussion and keep it moving? Which was next in this respect?
>
> Q. 20. Which member of the group contributed the best ideas for solving the problem? Which was next best in this respect?

Performance Ratings

The letters setting forth the problem solutions were typed, coded for identification, and rated in random order by two observers using a 20-point scale. The main criteria were "realism", cogency of expression, and how many facets of the problem were taken into account in the solution. The correlation between the 36 ratings given by the two raters was .59. Group performance was measured by averaging the two observers' ratings. Application of the Spearman-Brown formula to estimate reliability of the combined ratings yielded a coefficient of .74.

Procedure at Harvard

Subjects and Groups

A preliminary analysis of the Northwestern data indicated that probably most of the important changes had occurred by the fourth session. Because of the difficulty of getting all the subjects of a group back six times, it was decided to run only four groups for four sessions.

The groups were again composed of male undergraduates, but rather than using course students, volunteers were obtained from the Student Employment Service, and were paid the prevailing student rates. As at Northwestern, it was insured that the subjects did not know each other.

Finally, primarily for statistical reasons, the group size was increased from five to six. It was felt this would make little difference in a study of the development of structure, and yet give us certain statistical advantages; e.g. in testing the significance of rho.

Discussion Problems

The problems were again of a human relations sort. Although still primarily value-centered, the problems contained many more facts, and were thus considerably longer. Aside from providing more substance for the discussion, the additional facts tended to embed the value conflict and thus make it less obvious. An attempt was made to match the formal structure of the problems, and as far as possible to equalize the kind of interaction likely to be produced. To further eliminate any remaining problem differences, the order of presentation again followed a Latin Square design.

Instructions to Subjects

Although some differences should be noted between the Northwestern and Harvard instructions, they were again of a minor sort. First of all, before the first session the subjects were told a few things about the nature of the experiment including the characteristics and purpose of the one-way screen. The microphones were pointed out and the subjects were told that the sessions would be sound recorded. After this introduction, they were informed that they would have seven minutes to read the case at the end of which time the experimenter would take the cases out of the room. The subjects were asked to summarize the solution orally rather than write it. Finally, there was no offer of a prize or other extra inducement. It would seem that the prize made little difference to the Northwestern groups.

Status Rankings and Questionnaire Data

It will be remembered that the Northwestern groups were not asked any specific questions until the end of the experiment. For the Harvard groups on the other hand it was decided to pass out a questionnaire at the end of each session. This included the following items:

1. A 12 point rating scale on which the subject checked how well satisfied he was with the quality of the group solution to the problem.
2. A request to rank order the individuals in his group (including himself) on the following items:
   a. Who contributed the best ideas for solving the problem?
   b. Who did the most to guide the discussion and keep it moving effectively?

3. A series of four questions asking each individual whom he liked, disliked, and felt neutral toward among other members of the group.
4. A corresponding series of four questions asking each individual to guess how the other members felt toward him.
5. A list of 60 statements sometimes made about groups. The subject was asked to check any statement which he felt applied to this session of his group. Examples are:
   a. This group needs more information to do its job properly.
   b. The atmosphere in this group is pleasant and congenial.

At the end of the fourth session certain additional questions were asked. The only one of interest here is the question which was also asked the Northwestern groups at the end of their last session:

> Considering all the sessions, which member of the group would you say stood out most definitely as a leader in the discussion? How would you rank the others? Include yourself. (This provided the data for the so-called overall status rankings.)

Interaction Observations

At both Northwestern and Harvard the interaction of subjects was observed and categorized by two observers behind one-way mirrors. Table 1 shows the categories used. On the left is the set used at Harvard, developed by Bales, and described in previous publications.[2] On the right is the set used at Northwestern with certain categories grouped to show the correspondence with Bales' set. The Northwestern categories were developed independently from a previous 32 category list taken from Bales. In both sets of observations the behavior was recorded in terms of the "surface" meaning it presumably had in common for the person who made the contribution and the person it was directed toward. "Who-to-whom" was recorded in each case as well as category of the act. The scoring at Northwestern differed from that at Harvard however, in that at Northwestern larger units were used: a given contribution or speech was categorized only once, as one unit, unless the speaker's intent changed during the course of the speech. According to Bales' method used at Harvard, the contribution is broken down into single simple sentence units or acts, and a continuing speech by a single member may produce a number of scores all in the same category.

Reliability of categorization was determined at each place by comparing the records of two trained observers who scored simultaneously but independently. For each observer the raw number of scores obtained in a given

[2] See Bales, R. F., *Interaction Process Analysis*, Cambridge, Mass., Addison Wesley Press, 1950. See also item (2) under References.

single category was listed for the series of sessions (or sub-periods). A Pearson correlation was then computed between the series of the two observers. The resulting coefficients are presented with the category descriptions in Table 1 except in the cases of certain categories which yielded too few scores to make this analysis dependable. Coefficients for these categories

TABLE 1

CATEGORIES USED IN INTERACTION OBSERVATION AND RELIABILITIES OBTAINED

Categories by Sections		Harvard	r	Northwestern	r
A. POSITIVE REACTIONS	1	Shows Solidarity	—	Shows Solidarity	—
	2	Shows Tension Release	.90	Shows Tension Release[1]	.97
	3	Agrees	.88	Agrees	.95
B. ATTEMPTED ANSWERS	4	Gives Suggestion	.90	Gives Solution Requests Action	.92 .90
	5	Gives Opinion	.76	Gives Opinion	.93
	6	Gives Orientation	.86	Gives Orientation Gives Information[2]	.91 .78
C. QUESTIONS	7	Asks for Orientation			
	8	Asks for Opinion	.74	Asks Question	.80
	9	Asks for Suggestion			
D. NEGATIVE REACTIONS	10	Disagrees	.79	Disagrees	.94
	11	Shows Tension	—	Shows Tension Goes Out of Field	— —
	12	Shows Antagonism	—	Shows Antagonism	—
		Categories 1 + 2	.84	Categories 1 + 2	.93
		Categories 10 + 11 + 12	.86	Categories 10 + 11 + 12	.93

[1] The Northwestern category list included another category designed to score conversation not directly concerned with the problem, but not really Out of Field in nature. It showed the same trends over time as Tension Release and had a reliability of .93.

[2] The correspondence between these two categories and Bales' category No. 6 is not so exact as for some of the other pairings.

as grouped with their adjacent categories are given at the bottom of the table.

At Northwestern the coefficients obtained ranged from .78 to .97, with a median of .91. At Harvard they ranged from .74 to .90 with a median of .86.

A similar analysis of inter-observer agreement as to the direction of interaction (who-to-whom) was carried out separately for each of the pair relations in the group. The coefficients at Northwestern ranged from .69 to .98, with a median of .90. At Harvard the range was from .62 to .98, with a median of .91. At Northwestern the reliability figures are based on 14 of the total 36 sessions. At Harvard reliability figures are based on all of the sessions, plus 16 other five man sessions scored by the same two observers (Bales and Heinicke) for another purpose, with each session broken into three parts. The N is thus much larger for the Harvard figures (96 as compared to 14) and this probably accounts for the appearance of somewhat lower reliability. Over all, we consider the reliability to be satisfactory for interpretation of results, and a fair sample of the reliability which can be obtained from this method of interaction scoring. We feel confident that these figures can be improved somewhat by further training.

Analysis of Results

General Trends in Interaction

Figure 1 compares the interaction trends for the Harvard and Northwestern groups. Although there are differences in absolute amounts, the *trends* are generally very much the same for the two sets of groups. Most of the differences in absolute amounts are probably due to the difference in size of unit used in observation, though some may be due to the fact that the Harvard case problems contained many more "facts". It will be noticed that the Northwestern groups are generally lower in the "task-oriented" categories (giving orientation, opinion, and suggestion), and generally higher on agreement and disagreement. It is known that the "long speeches" of members tend to fall in the task-oriented categories. The method of scoring used for the Harvard groups broke these long speeches up into simple sentences, whereas the method used at Northwestern assigned only one score unless the category changed. Thus the difference between the groups on the balance between task-oriented and social-emotional categories is probably largely an artifact of scoring methods. This should be kept in mind in the later presentation of rates combining Harvard and Northwestern data. Comparisons in terms of absolute rates should be avoided, and attention

Figure 1: TRENDS IN INTERACTION OVER SIX SESSIONS

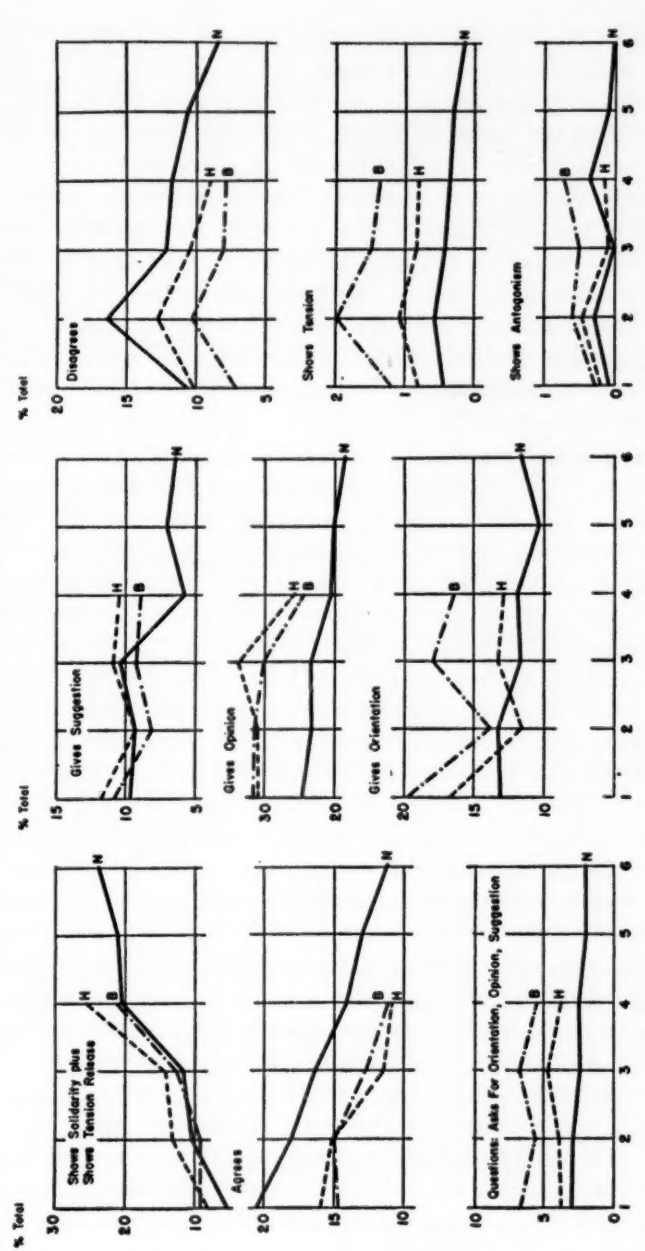


Figure 1: TRENDS IN INTERACTION OVER SIX SESSIONS

N: Northwestern Groups — H: Harvard Groups as Scored by Heinicke — B: Harvard Groups as Scored by Bales

should be focused on changes in rates through time, which are not seriously affected by the scoring differences.

Figure 1 also compares the two observers for the Harvard groups. Again there are some differences in absolute amounts, but no serious differences in trends. Finally, it may be noted that where trends can be discerned the two extra sessions of the Northwestern groups continue the trends in the same direction, thus justifying to some extent our assumption that four sessions would give us about as good an idea of major trend developments as six sessions. Since the present study is concerned primarily with developmental trends, the general correspondence in trends seems to justify pooling the data of the Northwestern and Harvard groups, and gives us some assurance that the trends we describe are reliable under similar but not identical conditions.

The rates by categories as they change over the four sessions for the pooled raw data on both Northwestern and Harvard groups are shown in Table 2. Most single category trends are not statistically significant. By larger groupings, however, there are highly significant trends. There is a trend toward decreasing rates in the task-oriented categories (giving orientation, giving opinion, and giving suggestion) and a concomitant rise in the social-emotional categories. Negative reactions are low in the first session, show a sharp rise in the second session, and thereafter decrease again. Positive reactions as a whole show a minor rise through the first three sessions, and then a larger rise in the fourth. There are two kinds of trends within the area of positive reactions, however. Overt showing of agreement shows a steady and significant downward trend, which is counteracted by a sharply rising trend of showing solidarity and tension release (largely joking and laughing). In other words there is a marked shift from the more neutral and tentative task-oriented "agreement" to the more affectively-charged types of Positive Reactions.

Described more globally, and with a little more interpretation, it appears that on the average these groups started in session 1 with a heavier emphasis on task-oriented types of interaction, with inhibition of the more affective types of reaction and with low rates of overt negative reactions. In session 2, however, overt negative reactions show a sharp rise, task-oriented activities begin to decline, and positive reactions, while maintaining their level, show a shift toward greater affect. It appears that session 2 is, on the average, the session of greatest conflict. In sessions 3 and 4 the shift toward greater affect and less emphasis on task-oriented activities continues,

TABLE 2

INTERACTION TRENDS OVER TIME FOR NORTHWESTERN AND HARVARD GROUPS COMBINED

Categories	Percentage Rates[1] by Session				Level of Significance[2]
	1	2	3	4	
1 + 2	8.0	9.8	12.1	21.0	**
3	18.2	16.8	14.9	12.7	**
4	10.1	8.9	10.0	6.9	
5	28.0	26.8	26.5	22.1	
6	15.6	13.4	14.1	13.7	
7 + 8 + 9	4.3	3.9	3.9	3.7	
10	9.2	13.9	10.5	10.1	
11	.7	1.1	.8	.8	
12	.1	.6	.2	.6	
A	26.9	27.1	27.8	33.9	**
B	54.6	49.7	51.3	43.4	
C	4.3	3.9	3.9	3.7	
D	10.5	16.0	11.8	12.0	**
A — D	15.0	6.8	14.5	19.8	**

[1] Whenever percentage measures were analyzed in this study, an angular transformation was used. (6) This involves converting percentages to the angles having the sine equal to the square root of the percentage. The transformation is appropriate in those cases where the totals on which the percentages are based, are fairly equal. The latter was insured to a sufficient extent by having the discussion last for about 40 minutes. The percentages shown do not always add to 100 percent. Partially this is due to the use of the arc sine transformation, but largely it is due to the omission of one of the Northwestern categories. See footnote 1, Table 1.

[2] Throughout this study one asterisk will be used to stand for the .05, two for the .01, and three for the .001 level of significance. Wherever an asterisk appears *between* two numbers it indicates that they differ significantly. Wherever no asterisk appears the differences are not significant.

but the negative reactions drop and the positive reactions rise. It appears that the groups have gone through some sort of "crisis".[3]

Although these data are of interest in themselves without further breakdown, it turned out that additional light could be thrown on the meaning of the interaction rates and other measures by the introduction of the concept of a "degree of structure" with which groups end their meetings. For present purposes we use the concept to refer mainly to the degree to which the

[3] The supposed mechanisms are elaborated in detail in Bales (2).

members agree on where each one stands in the status hierarchy of the group. We shall speak of this as the degree of "status consensus". In this paper we largely ignore the qualitative differentiation of roles, which is certainly of prime importance in any detailed understanding of the "structure" of groups.[4]

Through the use of member ratings of each other we were able to distinguish between groups which ended their sessions or meetings with a High degree or a Low degree of status consensus. The next section deals with the problem of how this division was made and later sections attempt to show how this distinction enabled us to clarify and sharpen the general picture obtained from the pooled interaction rates.

Division of Sample into High and Low Status-Consensus Groups

Since the concept of status is very general in nature, many specific operational definitions seem plausible. Our questionnaire data include member rankings of each other on "Who had the best ideas", and "Who did the most to guide the group" as well as a ranking on "Who stood out most definitely as leader". These ratings were available for both Northwestern and Harvard groups for the final session.

We should like to have status ratings for each session of each group as well as for the final session. For the Harvard groups we have the members' "idea" and "guidance" ranking for each session, whereas for the Northwestern groups we have observer ratings on leadership for each session, but no members' "idea" and "guidance" ranking except after the last session. Fortunately, all of these measures seem to be highly intercorrelated and we can take advantage of this fact to obtain roughly comparable status ratings for each session.

For the Northwestern groups after the final sessions the "idea ranking", correlates highly and significantly with the "leadership ranking", with a median rho of .875. The median rho for the correlation between "guidance ranking" and "leadership ranking" after these last sessions was also .875. For the Harvard groups the "idea ranking" after *each* session correlates with the "leadership ranking" after the final session with a median rho of .700, while the median rho for the correlation between "guidance ranking" on each of the four sessions and the "leadership ranking" was .872. Furthermore, for the Harvard groups the "idea ranking" and the "guidance ranking"

[4] The problem of the qualitative differentiation of roles and its relation to the developmental trends discussed in the present paper will be treated in another paper now in preparation. A beginning in this direction is contained in Bales (2).

for each of the four sessions correlate highly with each other with a median rho of .893. Finally, as reported above, it had been shown previously at Northwestern that rankings assigned by interaction observers after each session correlated with members' own final "leadership rankings" with a median rho of .900.

It seems a fair assumption that all of these measures are tapping the same broad factor, and that an acceptble general term for it is "status". On this assumption we can obtain roughly comparable status rankings of the members for each session of each group as well as strictly comparable measures for the final session of each. For the separate sessions of the Northwestern groups we use the observer's ratings. For the separate sessions of the Harvard groups we use the combined rankings on "best ideas" and "guidance". By comparing the rankings for individual sessions with the over-all rankings on leadership given at the end of the final session we can trace the course of changes in the status structure of each group through its series of sessions.

The above measures give status rankings for the members. Now what can we use as a measure of status-*consensus*? To illustrate in terms of an example: after the last session the members are asked to rank each other in term of "leadership". One can determine the extent to which they agree that No. 5 (identification number) ranks first, No. 1 is second, No. 4 is third, and this might be called a measure of status-*consensus*. M. G. Kendall (5) has reported a statistic, *W*, for indicating the degree of agreement in such a matrix of ranks. It is called the *Coefficient of Concordance* and is computed by the following formula:[5]

$$W = \frac{12S}{m^2(n^3 - n)}$$

where *S* equals the sum of the squares of the deviation of the column totals from the mean of these column totals, *n* equals the number of individuals (listed as the designations of columns), and *m* equals the number of individuals doing the ranking (listed as the designations of rows). Putting it in words, *W* is simply the ratio of the observed amount of deviation of the column totals from their mean to the maximum amount of column deviation possible for a given size matrix. When the agreement is perfect (that is, the observed column deviations are at a maximum), then *W* is equal to one; when there is no agreement, the column totals are all the same and *W* equals

[5] If there are many ties in the matrix of ranks, a correction is necessary. See Kendall (5) page 82.

zero. Using W as a measure then, we may define status-consensus as follows: a group is said to have a High degree of Consensus in the status rankings of members by each other as W of a matrix of these rankings approaches the value of 1 and to have a Low degree of Status-Consensus as W approaches a value of 0.

We are now in a position to divide our total sample into High and Low groups for further analysis. Using the W on the "leadership" ratings at the end of the last session as the index, a group was put in the High classification if its W was .500 or above and into the Low classification if its W was .499 or below. It turned out that one of the Harvard groups, and three of the Northwestern groups fall into the High status consensus classification, the six others were Low. A W of .500 was chosen as the dividing criterion because there seemed to be a gap in the distribution, and also because the secondary criteria of division noted below gave the same result.

For the Harvard groups it was possible to compute W indices on the "idea rankings" and "guidance rankings" made by the members at the end of each session. The two W's for each session were then averaged to obtain a single measure. This measure for the first session is considerably above .500 for the one High group, and below .500 for all three Low groups. Apparently the High group started high, and the Low groups started low. This is of considerable interest in relation to future studies. One may be able to differentiate High and Low groups at the end of the first session, and so predict something about their later developmental trends, since as we shall see, these trends seem to differ for the two types of groups.

Since we can not obtain a W for all of our groups, we fall back on another measure: the correlation of the status ranking of members for each session with their final ranking of each other on "leadership". It turns out that the correlation between the first session status ranking and the final "leadership ranking" is always above .800 for the High groups and always below .800 in the case of the Low groups. The first session status ranks then seem to be better predictors of the final ratings for the High groups than the Low groups. Finally, if we compute for each group the correlations between each of its session rankings and its final "leadership ranking", we find that the median rho for the High groups is .933 while the figure for the Low group is only .680. The difference between these median rho's is significant at the .01 level.[6] In other words, each of the session rankings

[6] Here as elsewhere in the paper the problem of independence was considered in computing the level of significance.

of the High groups on the average is a better predictor of the final status rankings than for the Low groups.

In summary, we have noted that the High groups have a *W* of .500 or higher both on the overall ratings and probably on the ratings of the first session. The extent of correlation between individual session rankings and the final "leadership rankings" is also higher for the High groups. This difference between High and Low groups is especially evident in the first session.

Before moving into the analysis and partially in anticipation, let us briefly examine the possible implications of the division into High and Low status consensus. First, it should be noted that the nature of the task (which lacks a clear criterion of successful solution other than group agreement) and the fact that the groups are initially leaderless tends to make it very important whether or not the members of the group can work out a satisfactory set of social-emotional relationships to each other. And surely an important aspect of this social-emotional set of problems is the settlement of problems of relative status or prestige as between members. One can also think of these as problems of "power" and "leadership". These terms are not all synonymous, but as a first approximation we lump these problems together as status problems.

One would expect that those groups which could arrive at a common (though perhaps unspoken) agreement as to the relative status of members would show a shorter period of overt disagreement and other negative reactions. That is, the lack of status consensus may be one important underlying factor associated with the degree of social-emotional conflict on the overt level.

Finally it seems reasonable to suppose that those groups which can solve adequately their problems of relative status will be more "efficient" in some sense, and also more "satisfied". The rest of the analysis will attempt to elaborate these general notions in terms of certain specific hypotheses.

Hypotheses About High Versus Low Groups

Hypothesis 1—*The developmental trends of groups initially high in status consensus show a decrease and then a gradual increase in status consensus, while those initially low in status consensus show a much less regular trend.*

Using the extent of correlation between individual session status rankings and the over-all status ranks as the best index of the trend of status consensus available for both Harvard and Northwestern groups, the High

and Low groups are compared in Table 3. Even though available only for the Harvard groups, the average of the "idea" and "guidance" *W*'s is also presented.

TABLE 3

TRENDS IN STATUS CONSENSUS OF HIGH AND LOW GROUPS

Indices of Status-Consensus	N	Types of Structure	Weekly Sessions			
			1	2	3	4
Mean rho between Session and Over-all Status Ranks:	4	High	.961 *	.822	.861	.914
	6	Low	.397 *	.638	.465	.529
Mean *W* on Sessions. Harvard Groups only:	1	High	.808	.552	.628	.736
	3	Low	.358	.401	.332	.395

In general the picture given by the two indices is similar. The High groups start with a relatively high status-consensus, drop in the second session, and then increase again regularly to the final session. The Low groups start low, increase, decrease, and increase in a zig-zag pattern. The difference in patterns may be visualized more clearly by reference to Figure 2.

It will be remembered that the Northwestern groups met for six sessions. If we compare the average rho between the session rank and the final "leadership rank" for the last two sessions with the corresponding average rho for the first four sessions, we find that there was a further slight increase in the last two sessions for the High groups. (See Table 4.) The structure trend for the High groups seems to show a significant decrease from the first to the second session and a gradual increase from there on to the last session.

While the High groups show a "crisis and recovery" trend, the pattern for the Low groups is one of continual fluctuation. There is a significant increase in status consensus from the first to the second session, then a decrease from the second to the third, and then again an increase from the third to the fourth session. Finally, using just the Northwestern data again, we find a decrease in the last two sessions when compared with the first four. (See Table 4.) For the *Northwestern* groups the difference between the mean rho's for the High and Low groups during the *first* four sessions does not reach significance. The difference between the means for the *last* two sessions is however significant at the .01 level. (See Table 4.)

In summary, the High groups show a dip and then a gradual increase in status-consensus while the comparable trend for the Low groups is much

less consistent. It seems quite clear that the two trends differ from each other.

Hypothesis 2—*Groups with High as well as Low initial status-consensus go through a period of overt social emotional conflict, but in the High groups this conflict is more sharply focussed in time and in terms of the status rank of the people involved.*

Figure 2

TRENDS IN STATUS-CONSENSUS FOR HIGH AND LOW GROUPS

(Data from Table 3)

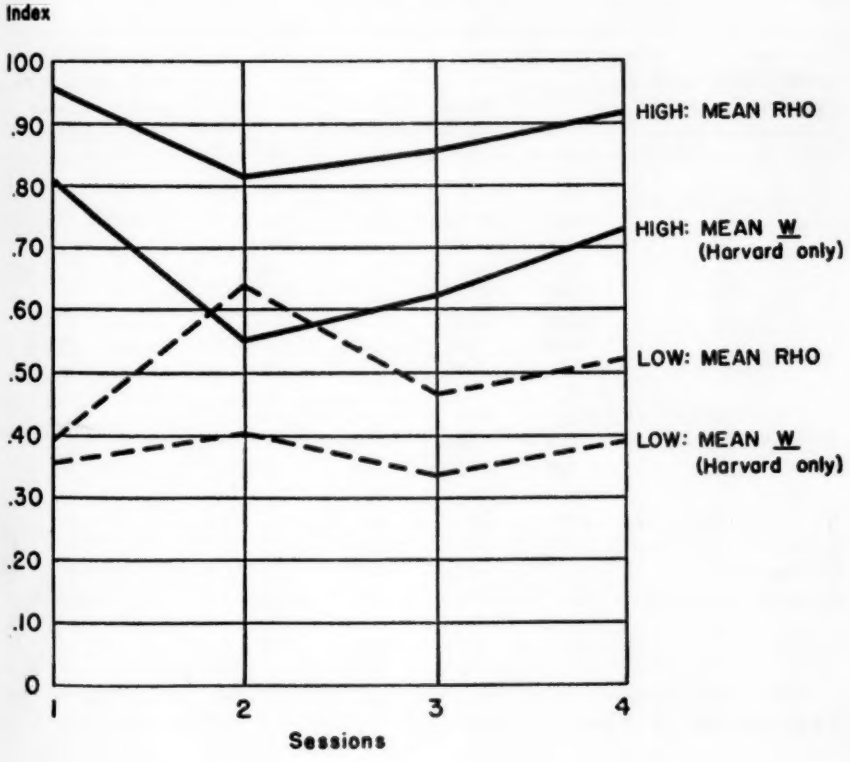


TABLE 4
CONTRASTING STRUCTURE OF HIGH AND LOW STATUS-CONSENSUS GROUPS IN FIRST FOUR AND LAST TWO SESSIONS
NORTHWESTERN GROUPS ONLY

Index of Structure	Type of Structure	First Four Sessions	Last Two Sessions
Mean Rho between Session and Over-all Status Rank	High	.893	.900 **
	Low	.507	.400

We now re-examine the interaction trends. Examination of Table 5 reveals that for the High groups the social emotional conflict was highest in the second session. An overall index of the social emotional balance

TABLE 5
MEAN PERCENTAGE OF GROUP INTERACTION IN VARIOUS CATEGORIES AND COMBINATION OF CATEGORIES IN SUCCESSIVE SESSIONS
HIGH GROUPS ONLY

Categories	Weekly Sessions				Level of Significance for total trend from session to session
	1	2	3	4	
1 + 2	6.1	7.4	15.2	18.4	**
3	17.7	16.4	14.7	12.6	
4	9.0	10.2	9.1	9.0	
5	27.2	27.4	23.7	23.3	
6	16.8	12.1	13.8	12.6	
7 + 8 + 9	4.2	3.4	2.9	3.5	
10	12.8	17.8	11.4	11.2	
11	.18	.49	.45	.47	
12	.06	.20	.01	.44	
A Positive Reactions	24.6	24.2 *	30.3	31.1	
B Attempted Answers	53.9	50.2	47.6	45.4	
C Questions	4.2	3.4	2.9	3.5	
D Negative Reactions	13.3	18.7	11.9	12.6	
A — D	10.5 *	2.7 **	16.2	17.5	*

The reader is reminded that the percentages shown do not add to 100, for the reasons explained in footnote 1, Table 2

(Positive Reactions minus Negative Reactions, or A per cent—D per cent) shows a significant drop from the first to the second session, and a significant increase from the second to the third session. The various components of the index are also given in Table 5. It should be noted that D per cent is made up mostly of category 10 (disagreement), and that categories 11 and 12 show the same trends as category 10. Also of interest is the fact that categories 4 and 5 tend to show the same trend as D per cent. Finally, it will be noticed that agreement shows a steady but non-significant drop in the first four sessions.

Turning now to Table 6 and the trends for the Low Groups, it should be noted first of all that there are no significant differences for the A per cent—D per cent index. Furthermore, the A per cent shows a significant decrease from session two to three.

The other indices seem to fit the general picture of increased conflict

TABLE 6

MEAN PERCENTAGE OF GROUP INTERACTION IN VARIOUS CATEGORIES AND COMBINATION OF CATEGORIES IN SUCCESSIVE SESSIONS
LOW GROUPS ONLY

Categories	Weekly Sessions				Level of Significance for total trend from session to session
	1	2	3	4	
1 + 2	9.4	11.5	10.4	22.9	**
3	18.5	17.1	15.0	12.8	**
4	10.9	8.1 *	10.5 *	5.7	**
5	28.6	26.5	28.5 **	21.3	*
6	14.9	14.3	14.3	14.5	
7 + 8 + 9	4.4	4.3	4.6	3.8	
10	7.2	11.6	10.0	9.5	
11	1.3	1.6	1.1	1.1	
12	.12	.61	.22	.60	
A Positive Reactions	28.5	29.1 *	26.1	35.9	
B Attempted Answers	55.3	49.3	53.9	42.2	
C Questions	4.4	4.3	4.6	3.8	
D Negative Reactions	8.7 *	14.3	11.7	11.6	
A—D	18.8	10.4	13.4	21.3	

See footnote 1, Table 5.

starting in the second session. Note the significant increase for D per cent from session one to two in spite of the fact that the *W* index at the *end* of this session is higher than at the end of the first. The fact that the trends in the Low groups for suggestion and opinion reach a high point in session three seems to fit into the picture of continued conflict in session three. That is, when groups are having trouble reaching agreement, there may be a tendency to initiate more and more suggestions and opinions. The fact that the correlation between giving suggestion and showing disagreement for the whole sample is .743 (significant at the .01 level) fits in with this interpretation. The correlation between the amount of opinion and disagreement is not significant, however. On the other hand, although not significant, the High groups also initiated the most opinion and suggestion during the session in which they showed the most disagreement.

Further confirmation is presented by the Northwestern groups for which we have data on two additional sessions. Table 7 compares the first four sessions, pooled, with the last two sessions, pooled. While little if any change was taking place in the Low group trend during the last two sessions, the High groups showed a significant increase in solidarity and tension release,

TABLE 7

MEAN PERCENTAGE OF GROUP INTERACTION IN VARIOUS CATEGORIES AND COMBINATION OF CATEGORIES FOR THE FIRST FOUR VERSUS THE LAST TWO SESSIONS OF THE NORTHWESTERN GROUPS

Categories	Type of Structure	First Four Sessions		Last Two Sessions
A — D	High	9.9	**	26.3
	Low	16.0		19.4
D	High	16.0	*	8.9
	Low	11.6		11.7
3	High	15.3	**	9.7
	Low	15.8		15.1
1 + 2	High	11.6	***	27.5
	Low	13.5		17.9
4	High	8.9		4.8
	Low	8.3		9.3
5	High	23.2	*	17.0
	Low	23.6		22.2

a significant decrease in the amount of negative social interaction, and a significant decrease in the amount of suggestion and opinion. The concomitant decline of the latter two categories and the negative categories (D per cent), seems further to fit the interpretation that the degree of consensus is reflected in the amount of suggestion and opinion.

What about the fact that the amount of agreement also declines? Does this not contradict the implication that a high state of consensus was reached in the High Northwestern groups during the last two sessions? It will be remembered that for the first four sessions both the High and Low groups showed a decline in overt agreement, although this trend was significant only for the Low groups (See Tables 4 and 5). It appears to us that a low rate of showing agreement can mean either that a state of conflict exists, and there is in fact little agreement in the underlying structural state, or it can mean that a high state of consensus in the underlying structural state has been reached so that there is little need for the overt expression of agreement. In other words, the rate of agreement taken alone is ambiguous. This is true of any of the rates taken alone.[7] Any given rate must be interpreted in conjunction with the total body of evidence covering the underlying structural state of the system. In this case, a drop in the rate of showing agreement coupled with a drop in showing disagreement, tension, and antagonism, and a rise in showing tension release and solidarity suggests an underlying structural state of growing consensus, with less need for routine guidance of the process by *signs* of agreement and disagreement, and more time for positive affective rewards which in a sense have become an expression of the existing state of consensus. On the other hand, a drop in the rate of agreement, *without* a corresponding drop in the rate of showing disagreement, tension, and antagonism, coupled with a rise in showing tension-release and solidarity suggests an underlying state of growing difficulty in consensus, with the tensions being "bled off" by tension release and attempts to improve the situation but with the underlying difficulty still unresolved.

Not only does the amount of social-emotional conflict tend to be focussed for the High groups in the second session, but it also tends to involve mainly the top status individuals. Computing the per cent of the total disagreement (category 10) expressed by the two individuals who received the two top status rankings at the end of the session, we find that their mean per cent in the High groups is considerably higher during the second session than in the other three sessions. The trend for the Low groups was not significant. (See Table 8.)

[7] As discussed at length in Bales, R. F., *Interaction Process Analysis*, pp. 117-122.

TABLE 8

MEAN EXTENT[1] OF DISAGREEMENT BETWEEN THE TWO TOP STATUS INDIVIDUALS

Type of Structure	Sessions				Significance level of total trend
	1	2	3	4	
High	5.0	30.8	6.9	11.2	*
Low	17.8	10.6	3.2	3.6	

[1] Extent was expressed as the ratio of the amount of disagreement between the two top individuals to the total amount of disagreement expressed by the group during the session.

In summary, the social emotional conflict of the High groups is focussed in the second session and shows a steady decline from there on. Furthermore, a large share of the disagreement during this session is taking place between the two top status individuals. The high point of social emotional conflict for the Low groups is less focussed both in time, and in terms of the individuals involved.

Hypothesis 3—*After passing the "crisis", the high status individuals in the High groups initiate less and less overt interaction in certain categories highly associated with status.*

It will be remembered that we have status rankings available for each session. We can also rank order the people in a group in terms of the amount which they initiated or received in a particular category during a particular session. We can then correlate the status ranks of each of the sessions with each of the category ranks. Finally, we can average all the rho's for a particular category to determine the average association between this category and status.

We are now in a position to see whether or not the high status people in the High groups tend to decrease their performance of these activities as the group meets again. Table 9 shows the changes in extent of association between status rank and category rank for those five categories which on the whole correlated highest with status. It will be seen that for the High groups there is a decrease in the extent of association between status and type of activity for each of the first five categories shown: Total initiated, total received, agreement received, suggestion initiated, and opinion initiated. For three of the categories this trend is significant. The Low groups on the other hand show no consistent or significant trends.

In summary then, the high status people in the High groups do tend

TABLE 9

CHANGES IN THE MEAN EXTENT OF ASSOCIATION (Rho) BETWEEN THE STATUS RANKINGS AND CERTAIN CATEGORIES[1]

Categories	Type of Structure	Weekly Sessions				Level of Significance of Total Trend
		1	2	3	4	
Total Initiated	High	.975	.971	.661	.554	**
	Low	.588	.431	.440	.602	
Total Received	High	.875	.932	.796	.807	
	Low	.593	.498	.690	.469	
Agreement Received	High	.950	.862	.782	.833	
	Low	.436	.671	.704	.664	
Suggestion Initiated	High	.993	.782	.382	.636	*
	Low	.588	.471	.726	.545	
Opinion Initiated	High	.946	.922	.586	.672	*
	Low	.448	.578	.469	.481	

[1] The analysis of variance was originally performed on the z equivalents of rho (See Snedecor, (6)). At the suggestion of F. Mosteller the computations were done on the raw rho's as well. It was felt that this procedure was more justifiable even though the results turned out to be the same. The raw mean rho's are reported here. The reader should not interpret these coefficients too literally, but rather concentrate on the differences in mean rho under various conditions.

to initiate less in the categories of activity most closely associated with high status, that is, the association between these activities and status decreases through time. It should be noted, however, that the average association between these activities and status is in each case significantly higher for the High groups. (See Table 10.) In other words, although the high status people in the High groups slacken off in their status associated activities as the group meets again and again, on the average they still perform them relatively more frequently than the high status people in the Low groups.

Further evidence supporting Hypothesis 3, is given in Figure 3. Shown here are the changes over time in the per cent of total activity initiated by each of the status ranks. For example, for the High groups, during the first session the Number 1 man in terms of status for that session initiated 32.8 per cent of the total activity. In the fourth session on the other hand the

TABLE 10

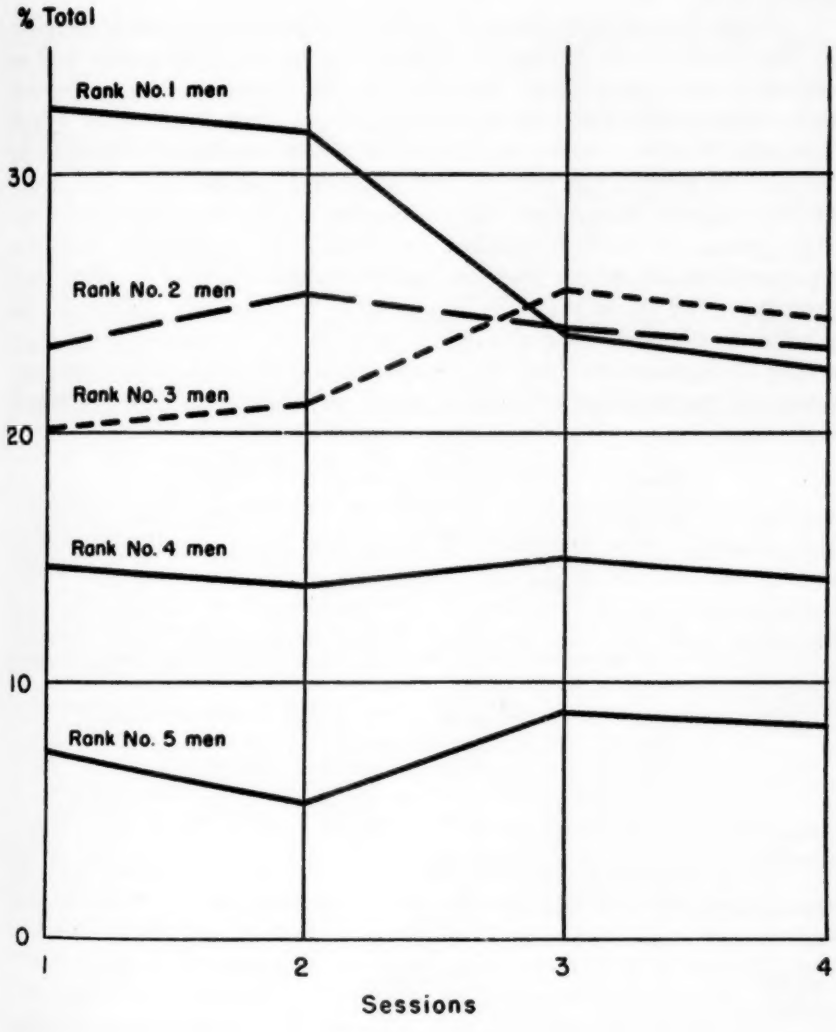
AVERAGE EXTENT OF ASSOCIATION (Rho) BETWEEN STATUS AND CERTAIN CATEGORIES FOR HIGH AND LOW GROUPS

Categories	Mean Rho for High Groups	Mean Rho for Low Groups	Significance Level of Difference
Total Initiated	.790	.515	**
Total Received	.853	.563	***
Agreement Received	.857	.619	*
Suggestion Initiated	.700	.583	*
Opinion Initiated	.781	.494	*

Number 1 man for the session initiated only 22.5 per cent of the total interaction. Of special interest is the fact that the major changes for the High groups occurs from the second to the third session. It will be remembered that the second session was the period of lowest status-consensus and highest social emotional conflict for High groups. Furthermore, it was seen that the top two status people exchanged the most disagreement during this session. It seems, therefore, that for the High groups, once the point of maximum conflict has been passed, the Number 1 status person tends to relax and to give up some of his activity-time to others. In the Low groups (not illustrated) the Number 1 status person actually increases his participation from the first session on to the third, when his activity is highest of the four sessions.

These trends in total initiation and especially the drop from the second to the third session throw further light on the High group trends in Table 8. If the Number 1 man shows the greatest drop in total initiation from session two to session three, his performance of status associated activities ought also to show the greatest decrease from session two to three. Translating this into rank order correlation coefficients, one would expect that the average extent of association between each of the status associated activities and status will be higher in session one and two than in session three and four. Table 10 contrasts the mean rho for the first two sessions with the mean rho for the last two sessions. It will be seen that in each case there is a drop

MEAN PERCENTAGE OF TOTAL ACTIVITY INITIATED BY VARIOUS STATUS RANKS HIGH GROUPS ONLY



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and that for four of the categories this change is significant. As one might expect, the greatest drops occur in the initiation categories. Thus while playing a less important role in terms of initiating certain activities, the high status individuals show less change in their roles of receiving activity. Although what one initiates will to a great extent determine what one receives, in general one has less control over what one receives than what one initiates.

Further inspection of Figure 3 reveals that while the trends in amounts of interaction for the Number 1, 2 and 3 men for the High groups tend to overlap in the later sessions, the trends for the Number 4 and 5 men are quite separate and show no significant changes. That is, Number 2 and especially Number 3 whose trend change is almost significant, seemed to be taking over most of the activity that Number 1 has dropped. The status rankings support this picture. An examination of the status rankings of the High groups for successive sessions (see Table 12) reveals that while the top three men are shifting positions, the fourth and fifth tend to retain their position. That is, in the High groups, once a man finds himself in the number 4 or 5 position he is likely to stay there. The changes take place among the higher status men. To examine these shifts in terms of a measure, let us say that if a man is Number 1 during the first session, and Number 2

TABLE 11

MEAN RHO BETWEEN STATUS AND CERTAIN CATEGORIES FOR FIRST TWO VERSUS SECOND TWO SESSIONS HIGH GROUPS ONLY

Categories	Mean Rho for First Two Sessions	Mean Rho for Second Two Sessions	Significance Level of Difference
Total Initiated	.973	.607	***
Total Received	.904	.802	
Agreement Received	.906	.808	
Suggestions Initiated	.888	.509	**
Opinion Initiated	.934	.629	**

during the second session, this is considered a shift of one, if he is Number 3, this is a shift of 2, etc. In the High groups the average number of shifts for the first three men is markedly and significantly higher than for the last two men, as shown in Table 12. For the Low groups the picture is different. In general the number of shifts is greater, and involves the lower status positions as well as the higher.

TABLE 12

MEAN NUMBER OF STATUS SHIFTS DURING FIRST FOUR MEETINGS FOR THE FIRST THREE AND THE LAST TWO STATUS POSITIONS[1]

Type of Structure	Mean Number of Status Shifts: For First Three Status Positions		For Last Two Status Positions
High	.972	***	.250
Low	1.232	***	1.486

[1] The final status ratings were used for separating the first three and the last two status positions.

Hypothesis 4—*The High groups are in general more satisfied both with their group and with the groups' solutions of the problems than the Low groups.*

Unfortunately data on satisfaction were available only for the Harvard groups. For these groups two independent measures were obtained. One consisted of a Guttman scale of .91 reproducibility derived from the opinion check list relating to satisfaction with the group. The scale was made up of the following items, and was originally constructed from data on groups other than those reported here:

1. The atmosphere in this group is pleasant and congenial.
2. There is plenty of freedom to talk in this group.
3. I am well satisfied with my position in this group.
4. The morale of this group at this point is high.
5. This is one of the best groups I have worked in.

The score here ranged from 0 to 5. The other was a check on a 12-point scale in answer to the question: "How satisfied were you with the solution to the problem". In Table 12 the means of the individual ratings for the four sessions of the one Harvard High group (a total of 24 ratings), are compared with means of the 72 ratings made by the Harvard Low groups. Both measures show the difference and both are highly significant. It seems

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TABLE 13
MEAN SATISFACTION RATINGS OF HIGH AND LOW STRUCTURE GROUPS
HARVARD ONLY

Satisfaction	Type of Group Structure High	Low	Significance Level of Difference
Mean Guttman Scale Rating	4.04	2.58	***
Mean Rating Scale Rating	10.04	7.92	***

clear that as far as the Harvard groups are concerned,[8] individuals taking part in sessions of the High status-consensus group were more satisfied both with their group and the solutions to the problems than the members of the Low status-consensus groups.

One additional finding is of interest here. For the three Harvard Low groups the average rho between status and a popularity ranking shows a consistent and significant (.01) decline. The mean rho's are .806 for the first session, .390 for the second, .238 for the third, and .031 for the fourth session. The popularity ranking was based on how many total positive sociometric choices a person received. It would seem that in the Low groups the amount of negative affect expressed toward the high status people increases through time. Not only are the members more dissatisfied than those belonging to High groups, but they also seem to become increasingly hostile toward their leaders.[9] Unfortunately sufficient data were not available to make a similar analysis for the High groups.

Hypothesis 5—*The High groups are more "efficient" than the Low groups*

While the satisfaction data were available only for the Harvard groups, the data to support this hypothesis are available only for the Northwestern groups. It will be remembered that for the Northwestern groups the written solution of each session of each group was rated by two raters in terms of certain criteria. (See section on Northwestern procedure.) Also available for each session was the duration in seconds of the total discussion. "Efficiency" was measured by the ratio of the productivity rating (average for

[8] The comparison involves very few groups, hence this finding must be tentative. Since the collection of the data here analyzed, however, further analysis of new data strongly supports the finding.

[9] This, we believe, is one of the most important mechanisms in the structural change of groups. Our data concerning the role structure will be presented in greater detail in later papers.

the two raters) to the length of the discussion in seconds. Multiplying the ratios by a constant, we find that the mean ratio for the High group is 20.0 while the mean ratio for the Low group is 12.8. This difference is just significant at the .05 level.

Discussion

No variables were explicitly manipulated in this study and the number of cases is small, consequently one can not be too confident in the interpretation of the findings. However, if this exploratory study is to stimulate further research into the factors affecting the development of structure in small groups, some of the more general implications should be pointed out.

Since the picture for the High groups seems clearer, let us discuss these results first. These groups had developed a high degree of status consensus by the end of the first session. During the second session, not only did the status consensus decline, but a somewhat different hierarchy emerged. In the course of this session the social emotional conflict reaches a peak and most of the disagreement is expressed between the two top status members. This increased overt struggle between the two top men, taken together with a general picture of increased conflict and a decline in status consensus lends plausibility to the interpretation that some kind of "status struggle" is taking place in the second session of the High groups. That is, the hierarchy which emerged in the first session is somehow challenged during the second session. After the second session, however, the challenge is apparently dealt with successfully. The old structure again emerges (rho of session status rankings with overall status rankings increases), the measure of status consensus increases, the general social-emotional picture becomes more positive, and the top status individuals play a much less active role in any disagreement that takes place.

A more detailed examination of the roles of these top status individuals throws further light on the general trend. During the first two sessions the Number 1 man plays a very active part. Apparently he must perform actively if he is to establish his position initially and then defend it. He is high on the initiation of suggestion and opinion, receives a lot of disagreement as well as agreement, and during the second session takes an active part in the struggle for status, presumably defending his top position. Having secured his position, however, he can, so to speak, "let up" in the third and fourth sessions, and thus permit others to play a more active role without losing his status. It is of interest, however, that he still receives the most responses, and especially receives a large portion of agreement. It appears that his opinions and suggestions tend to be accepted and he no longer has

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to do much to win his point. People in general look to him for approval (they address their remarks and suggestions to him), and they tend to accept his decisions.

A passage from W. F. Whyte's memorandum (8) referring to the gang analyzed in *Street Corner Society* seems appropriate here:

> "It is my observation that interaction can be patterned and still have no resemblance to [the] stereotype of autocratic leadership. Take, for example, Doc in the Norton's Gang as described in my *Street Corner Society*. Doc gave the impression of being quite unaggressive in that he did not often come out with ideas for action for the group. On the contrary, there were many occasions when members of the group would suggest actions that the group subsequently carried out. But note this important point. The suggestions were always made to Doc and were not acted upon positively unless Doc gave at least his acquiescence. I observed that activity involving the whole group would be initiated either through the acceptance by Doc of suggestions presented by others or by proposals directly from Doc to the group. I observed further that Doc tended to respond favorably most often to members of the group close to him in prestige, while suggestions of members of less importance were often passed over."

Relevant to the last observation is the fact that in the High group the Number 3 man took over most of the activity that the Number 1 man dropped in the third and fourth session. (See Figure 3 and the data on status reversals in Table 12.)

We have then a picture of the development of a status structure which permits the reaching of consensus on *task* problems. The Number 1 man (and possibly Numbers 2 and 3) have become, after the crisis, the main source for determining when something is "right". There is little need for a lot of overt expression of agreement—only a few statements made by the "right" people need to be agreed to. As it turned out, the agreement decreased significantly during the 5th and 6th session only for the High groups. When the status problem is settled, we may suppose, less time has to be spent in discussion which is essentially a thinly disguised attempt to change generalized status positions. Perhaps the solution of the status problem (whatever makes it possible in the first place) is mainly responsible for the higher satisfaction and higher efficiency found among the High groups.

The picture for the Low groups is much less clear. Little status consensus emerges by the end of the first session. Whatever hierarchy emerges appears to be challenged during the second session as overt negative reactions increase. The overt conflict during the session, however, may result in a clearer hierarchy by the end of the session. The measure of status consensus

is higher at the end of the second session for the Low groups than at the end of the first, but is still probably no higher than that of the High groups at the crisis. In the third session there is still another change in the nature of the hierarchy and the degree of status consensus decreases. Perhaps this third session is roughly analogous to the second session of the High groups. It appears that the status hierarchy which emerged by the end of the second session is challenged in the third, but a new status structure is not successfully established. This interpretation is much less clearly supported here than when applied to the High groups.

It seems fairly clear, however, that the Low groups never adequately solve the problem of status consensus. The fact that members at all levels continue to shift status positions may possibly be associated with the low degree of efficiency and satisfaction found in these groups. On the whole the Low groups are characterized by a failure to develop a pattern of relationships for deciding who stands where, and whose solutions are apt to be "right". Rather they tend to express more and more dislike of the top status members on the sociometric choices, and depose them one after another.

One could, of course, assume that the Low groups represent a kind of junk category which in actuality has in it many different kinds of trends. Even if this is true it would be of interest to know that groups which initially have difficulty in organizing show a greater variety of trends and attempts to organize than those which do not have this initial difficulty. On the other hand, the evidence suggests that even groups with a high degree of initial status consensus have internal strains which tend to result in a "crisis".

Summary

Various aspects of the development of status structure were studied in a number of newly formed initially leaderless groups during a series of meetings under reasonably constant laboratory conditions. The subjects were asked to discuss and solve a human relations problem within a period of about 40 minutes. The successive meetings of ten small groups of undergraduate students were observed using Bales' interaction category system. Observer ratings and subjects' ratings of each other were also available as sources of data.

To analyze the developmental trends of the groups, they were divided into a High and Low status-consensus classification. The analysis of trends was organized in terms of five main hypotheses, all of which receive substantial support from the data:

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Hypothesis 1—The developmental trends of groups initially High in status consensus show a decrease and then a gradual increase in status consensus, while those initially Low in status consensus show a much less regular trend.

Hypothesis 2—Groups with High as well as Low initial status-consensus go through a period of overt social emotional conflict, but in the High groups this conflict is more sharply focussed in time and in terms of the status of the people involved.

Hypothesis 3—After passing the "crisis", the high status individuals in the High groups initiate less and less overt interaction in certain categories highly associated with status.

Hypothesis 4—The High groups are in general more satisfied both with their group and with the groups' solutions of the problems than the Low groups.

Hypothesis 5—The High groups are more "efficient" than the Low groups.

The findings were discussed in more general terms. It is hoped that this study will provide a basis for exploring further the factors which effect the development of structure in groups.

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SOCIOMETRIC RELATIONSHIPS AMONG GRAMMAR SCHOOL BOYS AND GIRLS BETWEEN THE AGES OF ELEVEN AND SIXTEEN YEARS

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In his classic text-book on sociometry, *Who Shall Survive?*,[1] Dr. J. L. Moreno indicated the need for further research into children's groups in order to discover the optimum forms of organization at each age-level. This present study was an attempt at such research.[2]

The findings may prove to be of interest at the present time in that they afford evidence, obtained by the use of sociometric techniques, of the mode of development of hierarchical structures in children's groups and of the value-systems associated with those structures.

Reading *The Human Group*,[3] and the critical review of this work in Sociometry,[4] the writer noted that both Professor Homans and Miss Rogers assume the tendency of the small group to develop a hierarchical structure, although such a structure may appear to be unnecessary to the purposes of the group. This tendency was very apparent in the groups included in this present study, when successive applications of the sociometric test showed progressively fewer mutual choices and a centring of attention upon a relatively small number of group members. An attempt was made to relate such development to the values held by the group and to the environment represented by the school in which the investigation took place, and it was found that, as the necessity arose, a group developed similar but secondary forms of organization for specific purposes.

The Hypotheses

The specific hypotheses relating to group structure were as follows:—

1. That children in school classes are organized in groups which are relatively stable over short time intervals and can be identified by means of sociometric tests.

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[1] J. L. Moreno, Who Shall Survive?, Beacon House, New York, 1934 and 1953.

[2] This study was carried out under the supervision of Dr. C. M. Fleming, University of London Institute of Education.

[3] Homans, G. C., The Human Group. New York: Harcourt, Brace and Co., 1950. London: Routledge, 1951.

[4] Rogers, M., "The Human Group: A Critical Review with Suggestions for Some Alternative Hypotheses." SOCIOMETRY, Vol. XIV, No. 1., Feb., 1951. Pp. 20-31.

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2. That each of these groups had its own value system,[4a] which is similar in greater or lesser degree to the value system of the school staff. Those groups with values least compatible with the purposes of the school will show a high proportion of absenteeism and of early leavers.

3. That the Sociodynamic Law[5] applies to classroom groups, i.e., that the distribution of sociometric scores for such groups will be positively skewed.

4. That the values of these groups will be personified in those individuals who are much-chosen on a sociometric test.

The hypotheses relating to the development of group structure were, in effect, the above hypotheses viewed as a developing process, namely:—

5. That there is a tendency in the life history of any particular group for more choices to go to fewer members of the group.

6. That this tendency is related to the development of the value system of the group. Values develop by becoming more precisely embodied in the persons of fewer members of the group.

Both hypotheses, 5 and 6, represent the achievement by the group of greater cohesion, obtained by externalizing its values. It would seem that personification of values in this way is particularly common in recently-formed groups, and all adolescent groups are of recent origin.

7. That this development of structure and of values is subject to modification by forces both internal and external to the group. For example, an unfavorable environment may cause reversion to an earlier stage of development, and separation of group members, as by a long school holiday, may cause the disintegration of the group.

Substantiation of these hypotheses would imply that sociometric rank is a function not only of personality but also of group structure and development, and that although constant over a short period of time, it would be subject to change over longer periods. It would further imply that insofar as value systems differ, individuals of high sociometric rank will show no one personality pattern.

Further hypotheses concerning group methods of teaching are omitted from this account of the study.

[4a] For a discussion of value systems which was one of the sources of this hypothesis, see Mannheim, K., Diagnosis of Our Time. London: Kegan Paul, 1943, Ch. 2, The Crisis in Valuation.

[5] Moreno, J. L., "The Three Branches of Sociometry: A Postscript." SOCIOMETRY, Vol. XI, No. 1-2, Feb.-May, 1948. Pp. 121-128.

The Subjects

The investigation took place in a co-educational grammar school on the outskirts of London, in which the writer was teaching geography. It covered in all a period of three years from June, 1947, to June, 1950, and included some three hundred boys and girls in eleven forms. The main section of the enquiry, part of which is reported here, concerned one hundred and fifty subjects in five forms over a period of one year, from September, 1947, to September, 1948.

Selected pupils entered the school at the age of eleven years and the course finished at the age of sixteen or eighteen years. Pupils were expected to stay the full course but were legally free to leave the school upon reaching the age of fifteen years. There was a four-form entry, each form including both boys and girls. Allocation to the four first-year forms was on a chance basis, but pupils were re-graded on the basis of examination results at the end of the second year. This re-grading was an important factor in the environment of both second- and third-year forms. The most successful pupils were placed in two forms, one specializing in arts subjects and the other in sciences, whilst the remaining pupils went into two parallel non-specialist forms.

The fourth year of 1947-48 was exceptional in that it had not been graded as had other years. There was one specialist form, 4 Science, but it was small in number and contained principally those members of the year who wished to specialize in science. The other three fourth-year forms were parallel and largely un-selected. Their school environment had been to this extent different from that of the third-year forms.

The four forms reported here include one fourth-year form, 4C; one third-year non-specialist form, 3A; one second-year form, 2D; and one first-year form, 1C.

The Tests and Observations Used

Group structure and development were investigated by means of sociometric tests which were given to each form in September, 1947, at the beginning of the school year;[6] in January, 1948, at the beginning of the spring term; in April, 1948, at the beginning of the summer term; and in July, 1948, at the end of the summer term.

In each case the criterion of sitting together was used for the first two tests, and the three criteria of sitting together, working together and

[6] Unless otherwise specified the word "year" will henceforth refer to the school year, which began in September.

friendship were used for the other tests. Three choices were given on each criterion, rejections were allowed but not required, and choices were limited to the form-group. Stars and isolates were defined by the use of Bronfenbrenner's "critical raw scores."[7]

An individual's sociometric "score" on any particular test was obtained by the addition of all the choices received by him on the three criteria, and since these scores are in fact ranks, all correlations involving sociometric "scores" were obtained by the use of the Spearman Rank Correlation Coefficient. Following the advice of Professor Thomson,[8] no coefficient was considered significant which did not exceed five times the probable error as obtained by the formula applicable to the product-moment coefficient.

Information regarding the systems of values in the groups discovered by means of the sociometric tests was not easy to obtain. Values could not be measured directly. They had to be inferred, and there was therefore a subjective element introduced into their identification. Moreover, the values identified were necessarily limited by the scope and imperfections of the several techniques used. It is not implied in the discussion of any group that there were no important values other than those mentioned. It frequently occurred, however, that the conclusions derived from the use of one technique were corroborated by those obtained from another, and it is considered that sufficient reliable information was obtained to make tentative assessments of several value systems, and to draw significant contrasts between the values of different groups.

A *Guess Who? Test,* similar to that used by Tryon,[9] was given to each form in July. This test consisted of forty-four brief descriptions in twenty-two pairs, covering each aspect, positive and negative, of twenty-two personality traits. The subjects were asked to read each description, guess which member or members of their own form were referred to, and write the name or names in the space provided. A score of +1 was awarded for a "mention" received on the positive aspect of a trait, and —1 for a "mention" on a negative aspect. An individual's score of any one trait was the sum of the number of "mentions" he received.

The Otis Self-Administering Test of Mental Ability, Higher Examina-

[7] Bronfenbrenner, U., "A Constant Frame of Reference for Sociometric Research." SOCIOMETRY, Vol. VII, No. 4, November, 1943. Pp. 363-396. Also Sociometry Monograph No. 6.

[8] Thomson, F. H., How to Calculate Correlations. London: Harrap, 1947. P. 18.

[9] Tryon, C. M., "Evaluations of Adolescent Personality by Adolescents," in Barker, R. G., Kounin, J. S., and Wright, H. F. (eds.), Child Behavior and Development. New York, McGraw-Hill, 1943. Pp. 545-566.

tion, Form B, was given to form 4C in July. The Intermediate Examination, Form A, was given to form 2D at the same time. For 4C an assessment of personality traits was obtained by means of the Bernreuter Personality Inventory. Finally, written observations of behavior were kept for all forms, particularly during the summer term and in lessons in which group work was in progress. These included one-minute observations of small groups at work.

Certain other tests were also used but need not be mentioned in this report.[10]

Upon examining the findings of this study it was noticed that in each form there was an almost complete cleavage throughout the year between the two sexes. There were, in effect, two groups inside each form, sometimes at different stages of development and with different values. Each sex-group will therefore be considered separately.

Form 4C Boys

The fourteen boys in form 4C developed more closely than did any other group according to the hypotheses laid down above. They followed a line of development which is possibly typical of small groups, but which is in many cases interrupted by extrinsic factors.

A sociometric test was given to this form in June, 1947, towards the end of its third school year, on the two criteria of working together and friendship. No definite sub-grouping could be seen amongst the boys. There were several mutual pairs and one triangle, and an interesting but as yet indefinite centring of choices around a group of seven boys, Clark, James, B. Peck, Graham, Higgens, Cook and Benson. The other seven boys tended to be on the edge of the main stream of choices. There were two stars, James and Benson.

There then intervened a long holiday and it was possibly the lack of opportunity for interaction which by September had caused some disorganization of the group which had been forming and the disappearance of the two stars. Still, however, the only boys receiving more than the "expected"[11] number of choices were Clark, James, B. Peck, Graham and Cook, whilst

[10] For full details—see Hallworth, H. J., A Study of Group Relationships Among Grammar School Boys and Girls Between the Ages of Eleven and Sixteen Years. M.A. (Education) Unpublished Thesis, University of London Library, 1951.

[11] "Expected" here means that number of choices, the probability of receiving which, on a chance basis, is .5. Using one criterion and three choices, the "expected" number of choices received is assumed to be three. With three criteria and three choices on each, it is assumed to be nine. See Bronfenbrenner, U., *Loc. cit.*

Higgens received the expected number. All other boys but one received fewer than the expected number of choices. There were here the beginnings of organization but there was not as yet an effectively integrated group.

By January the nuclear group was smaller, and consisted of four boys, Clark, James, Higgens and Cook. These were the only boys to receive more than the expected number of choices and Cook was now a star. Of the other boys, two were isolates. Obviously the boys of this form were becoming one large group, centred upon a small group of four and upon Cook in particular. Choices came to this group from all the boys in the class. Rejections went entirely to those who had never been part of this group, but those boys who were rejected did not organize into a defensive group. Apparently they still subscribed to the values upheld by the others.

The April sociometric test showed that this structure had developed still further. Of the four boys in the nuclear group, Clark and James had in January made a mutual pair on all sociograms, as had Higgens and Cook. Higgens had also made a triangle with the other pair. Now the four made a square, each of them giving all three choices to the others on the first two criteria. On the third criterion they were less well integrated. It was as if a nuclear group had crystallized out for those purposes concerned with school routine, but had not yet extended its influence into private life. The four boys concerned had a positive and co-operative attitude towards form and school life. They were a centre of admiration and respect for the others, and they associated with each other for many school purposes. Again, on the first criterion Cook was a star. There were two isolates. Taking three criteria into consideration there was also another star, Clark, and the nuclear group obtained fifty-five per cent of the choices received by the boys.

The last sociometric test, given in July at the end of the school year, provided remarkable confirmation of the hypotheses underlying this study. On each of the three criteria the fourteen boys were now centred around the nuclear group of four, and around Cook in particular. This group was itself tightly-knit. There were altogether sixteen reciprocated choices between these four boys, and only seven between the ten other boys. Sixty-five per cent of the boys' choices now went to the nuclear group. Cook and Higgens were stars, receiving one quarter and one fifth of the choices respectively. James and Clark were near-stars. Of the other boys, none received the expected number of choices and seven were isolates. The distribution of scores was far more positively skewed than it had been in April, and the

average number of mutual choices per individual, which has dropped almost continuously throughout the year, was now at its lowest.[12]

Such a structure might lead to the conclusion that there was here no effective group at all, were this not denied by the other evidence available. This group was probably better integrated than any other group studied and its values are of some interest. All the boys in the nuclear group were good at, or very interested in, athletics, football and cricket. Moreover, although they had quite definite personalities they were not unpleasantly aggressive towards others as were certain boys in the form.

On the *Guess Who? Test* five boys were mentioned as being friendly, and four of these were the boys in the nuclear group. Cook, Higgens and James were the only boys mentioned as being active in athletics and neat in appearance, and in each case Cook ranked first. These three were also among the five boys mentioned as enthusiastic, whilst Cook and James were two of the three boys considered good-looking and popular. Of the nuclear group, Cook was as outstanding as he had been on the sociometric test. He received more mentions than anyone else in the form as being active in games, popular, and enthusiastic and energetic, and as never trying to attract attention to himself, shy in class, and able to work quietly. His popularity would appear to have been due to his ability at games and to his generally pleasant but enthusiastic personality.

Among the isolates on the July sociometric test, those who had lost choices owing to the development of the group structure received relatively few mentions on the *Guess Who? Test*. Lyon, however, had always been an isolate or near-isolate, and the manner in which he was evaluated by his peers gave an indication of those personality traits of which these boys disapproved. He received a greater total of mentions than any other person in the form and was the most frequently mentioned as always trying to attract attention to himself, sure of himself but unable to sit still in class, constantly talking, causing or taking part in fights, being childish in outlook, daring, unkempt, and always trying to boss others. Although instructed not to enter his own name in the *Guess Who? Test* he gave himself a long list of commendable traits. He considered himself grown-up in attitude, neat and tidy, and good-looking and attractive, but apparently had some insight into his own personality in that he realized he was bossy.

It was often found in this study that sub-groups and mutual pairs were credited with similar traits in the manner already demonstrated in the case

[12] The figures were: June, .857; September, .786; January, .642; April, .666; July, .547.

of the nuclear group above. There was one boy, Foley, with whom Lyon most frequently associated and with whom he sometimes made a mutual pair on the sociograms. These boys were mentioned more frequently than anyone else in the form as causing or taking part in fights, and as being daring and ready to take a risk. Both received in the July sociometric test more rejections than any other boy. Lyon received twice as many mentions as Foley as causing fights: he also received twice as many rejections.

Correlations were made between July sociometric ranks and ranks based on each of the six scales of the Bernreuter Personality Inventory. No coefficient was significant. Similarly there was no significant correlation between sociometric ranks and ranks based upon deviation from the mean of the BI-N scale, measuring neurotic tendency, or between deviation from the expected score on the sociometric test and neurotic tendency. Nor was there any significant correlation between sociometric status and intelligence as measured by the Otis test.

Between July sociometric ranks and ranks based upon end-of-year school examinations given in the same month, however, there was a significant correlation of $+.75 \pm .11$. This confirmed the opinion already formed of these boys, that although as a group they placed games and athletics first, yet they were serious-minded, co-operative in all the purposes of the school, and held success in school work high in their system of values.

It appeared, then, that highest in the hierarchy of values formed by the boys of form 4C came activity in athletics and friendliness. Cook was an outstanding games player and athlete, who later began a career as a professional footballer. James was a very successful sprinter. Almost every one of the fourteen boys was interested in games and athletics and they provided most of the middle-school athletics team. Their next highest value appeared to be success in school work. They also placed a high value upon neatness in appearance and enthusiasm, and upon the ability to work quietly and the absence of behaviour designed to attract attention. A negative value was placed upon fighting. It would seem that daring behaviour which was within the limits allowed by adult values was highly regarded, but that no very high value was placed upon daring behaviour which was outside such limits. A negative value was placed upon the fear of doing anything which involved a risk.

It was apparent from observation that the organization and values which these boys had developed was maintained during the following year when they were in the fifth form. The only change in the nuclear group took place when Clark had to leave school following the death of his father. In

September, 1948, both Cook and James were elected school prefects, and Higgens was elected a probationer prefect. It was the practice for fourth, fifth and sixth forms to nominate and elect prefects. Although they were only in the fifth year, Cook was at the top of the poll, James second. No other boy or girl in the parallel forms, 4A, 4B and 4C became a prefect during the fifth year.

In July, 1949, almost all the members of these three forms left school and it is remarkable that whilst every other group immediately disintegrated, this hierarchically structured group of boys in 4C continued its existence. To every public school function during the year 1949-50 some of these boys returned, always as a small group. They continued as a loosely-knit group until they were called for National Service, and the individuals most in evidence were still Cook, Higgins and James.

Form 4C Girls

Group development among the ten girls of form 4C appeared to follow a process similar in fundamental respects to that among the boys, but different in detail.

When the first sociometric test was given in June, 1947, these girls were seen to be split into two sub-groups. Three girls, Daphne, Violet and Laura, made a triangle which received no choices from the other girls. There were no stars or isolates. The same pattern appeared again in September, with certain small changes in the large sub-group. May was now very much on the edge of this group, whilst Jane and Joy were at the centre, with Clarice and Grace on one side and Audrey and Bronwen on the other. Grace, receiving only one choice, was on the outer edge of the group. The only choice linking the two sub-groups was from Daphne to May.

In January, 1948, the large group was very tightly knit. Audrey and Bronwen were nearer the centre of this group, but Grace and May were still towards the edge. May did indeed receive one rejection, from Joy. All other rejections were between the two sub-groups. Every girl in the larger group now rejected each of the three girls in the smaller group. Only one rejection went from the smaller group to the larger: Daphne rejected Audrey.

The two groups presented an interesting contrast. Obviously the larger group was dominant and could afford to express rejections. The smaller group was on the defensive. The girls in the larger group, except perhaps May, were neatly and tidily dressed, had well-groomed hair, used cosmetics outside school, and could get on quite easily with boys. Daphne, Violet and Laura had refused or had been unable to grow up so successfully. They were not so smartly dressed, and Daphne and Laura paid little attention to

the appearance of their hair. All three were shy, possibly because they realized they were in a small defensive group, cut off from the main stream of school life, and they were unable to talk without embarrassment to the boys of the form. Violet and Laura had well-to-do parents but were both immature physically and emotionally. Daphne was more mature, but of poor parents. This was perhaps the most inhibiting factor in her social development.

By April, 1948, Audrey and Bronwen were receiving more choices inside the large group, whilst Jane and Joy received fewer. This was possibly due to the fact that the last two girls were somewhat immature as compared with the other four girls in this group. May was still on the edge of the group and was again rejected by Joy. When choices on all three criteria were considered, Bronwen was a star, Audrey a near-star, and May a near-isolate.

The smaller group was apparently breaking up. Although still chosen by Violet and Laura, Daphne rejected both of them. She also rejected Audrey, and on each criterion sent one choice to May. However, May in turn rejected Daphne. This was apparently a case of a girl isolating herself. Daphne had become conscious of her position inside a small, rejected group of girls and she wished to be accepted by the larger group. Her first step towards gaining acceptance was to break with the smaller group. Violet and Laura were quite unable to understand her attitude. Daphne picked quarrels with them, would not reply although spoken to very pleasantly, and in many other ways indicated that she did not wish to associate with them. Taking three criteria into consideration, Violet and Laura were now isolates.

At the time of the last sociometric test, given to these girls in July, 1948, one member of the larger group, Clarice, was about to leave school. The other girls knew this and modified their choices accordingly, therefore Clarice was excluded from this test. The larger group in July was therefore not strictly comparable with that group in April. However, it still appeared, with Joy, Jane, Bronwen and Audrey at the centre, and with Grace and May on the edge. The smaller group had now disintegrated and Daphne, Violet and Laura were all isolates. Again Daphne chose May and was rejected by her, whilst May in turn was rejected by Jane and Joy. It appeared that each girl was trying to improve her own rank by associating with those of superior rank, whilst herself rejecting those of inferior rank.

The process of development seen here was noted also among the girls of the parallel fourth form concerned in this study. A few girls had provided

a system of values for the whole group of girls. They had first formed a larger sub-group, and the prestige and attractive power of this sub-group had later broken up the smaller sub-group. In December, 1947, Violet herself complained to the writer that the girls in the form had always been divided into two groups. She at that time included May in her own group. It could hardly have been maintained that there were two groups in July, 1948: Laura and Violet were the only two girls not sending choices to the larger group. Further, they too admired some members of the larger group, and both voted to have Audrey act as form representative in the organizing of the Christmas party.

The girls at the center of the larger group, and Audrey and Bronwen in particular, made scores as distinctive on the *Guess Who? Test* as they did on the sociometric tests. When Clarice was excluded from the results they were the only four girls mentioned as being friendly, and as being happy and always smiling. Audrey and Joy were the only girls considered popular. Audrey and Bronwen, a mutual pair, were the only girls mentioned as being neat and tidy, and both were mentioned frequently; they also received the only mentions as being good-looking and attractive.

Clarice and Grace were a mutual pair throughout the year. They were part of the larger group, but Grace was always on the edge of this group. On the *Guess Who? Test* Clarice received mentions on the same traits as did the four girls at the centre of the group. Both she and Grace, however, were mentioned together on certain other traits. They were mentioned more frequently than any other girls as being able to work quietly, and they were the only girls considered grown-up and confident when talking to adults. Grace received most mentions on the last two criteria; she was also one of the two girls mentioned as being "bossy."

It appeared that to be considered grown-up was frequently to be considered "not quite one of us." It was possibly such a trait which prevented Clarice from reaching the same sociometric rank as the four girls at the center of this larger group, and which kept Grace on the edge of the group.

In complete contrast to the members of the larger group were the three girls who had made the smaller group, Violet, Laura and Daphne. They were the only three girls mentioned as being shy with adults and as being avoided by other people and unpopular. Further, they all received several mentions as being unattractive, whereas only one other girl received one such mention. All were considered inactive in games and Violet was considered childish. Daphne and Laura were mentioned as not talking very much, listless, unable to take a joke, and rather unfriendly. In each case

Daphne received far more mentions than any other person in the class. She also received most mentions as being shy, rarely laughing at a joke, never laughing at herself, and as being not very happy and not smiling.

One girl only was mentioned as being active in games, namely May. She was also considered more enthusiastic than any other girl, but "bossy" and childish. On the sociogram she was always on the edge of the larger group. Apparently games and enthusiasm were not rated very highly by the girls of form 4C.

July sociometric ranks were, as in the case of the boys, correlated with ranks on each of the six traits measured by the Bernreuter Personality Inventory, and with ranks based upon deviation from the average degree of neurotic tendency. In this case, however, two significant coefficients were obtained, namely $-.77 \pm .13$ with the B2-S scale (a measure of self-sufficiency), and $-.80 \pm .12$ with the F2-S scale (a measure of sociability). In other words, there was a tendency in this group for those girls to have a high sociometric rank who most disliked solitude and were most sociable, and for those girls to have a low sociometric rank who were most self-sufficient and non-social.

No significant correlations were obtained with either intelligence or attainment.

It was, then, inferred that this group of girls in form 4C valued highly both friendliness and sociability, and a "happy and smiling" disposition. Other important values concerned personal neatness and tidiness, and good looks and attractiveness, the latter trait appearing to be closely connected with the former. Also quite highly valued were an ability to work quietly and a certain amount of general activity; the group disapproved of listlessness. A somewhat lower value appeared to be placed upon ability to laugh at a joke, and upon ability in games.

Among the girls of form 4C, as among the boys, there was a tendency for members of a mutual pair of a sub-group to have the same sociometric rank and to be similarly evaluated by their peers. In other words, both members of a mutual pair or all members of one sub-group were considered to behave according to similar standards, to have the same kind of values; and further, these values and the persons who held them were gradually given, by the group as a whole, a place in a developing hierarchy of values and of social rank.

It would appear that sociometric choosing is, from one point of view, a process of accepting and forming a system of values. In rejecting Violet and Laura in the July sociometric test, Daphne was rejecting one set of

values and accepting another. In rejecting Daphne and choosing girls in the larger group, May was acting in the same way. The values associated with the larger sub-group were gradually becoming the dominant values of the whole group. The only positive value now attributable to the smaller group was a generally placid and unasssuming disposition: it was considered that this group, at an earlier stage of its development during the third year, had probably held a number of positive values which it was now in the process of losing when faced with those of the larger group, whose values were more nearly coincident with the values of the larger society of which these girls and the school formed a part.

Form 3A Girls

The two sex-groups in form 3A showed a tendency to follow the same pattern of development as did those in form 4C, but with differences due, apparently, to a different relationship with their environment. Form 3A was a non-specialist form. Its members had, in effect, very recently met with a defeat inside the school when they had failed to obtain places in the specialist third-year forms. They were therefore in a state of conflict with their environment and would have difficulty in forming integrated groups around personalities representing values coincident with the purposes of the school. This potential aggressiveness became most overt in the girls' group.

The sociogram for the test given in September, 1947, presented a striking contrast with any obtained for the fourth forms. The seventeen girls and twelve boys of 3A had recently come together from four second-year forms. They now made three squares and fourteen triangles, as large a proportion of such formations as was found on any of the sociograms drawn during this study, but not unusual for forms at the beginning of the third year. Every individual in the form, except one, made a mutual choice, and all mutual first choices except one were between individuals coming from the same form in the second year. Groupings appeared to be largely based upon membership of previous forms, particularly in the case of the girls. One complete square was made by girls coming from the same second forms, although there had been no association between the two pairs of girls, Pat and Rita, Doris and Edna, when a sociometric test had been given to their form in the previous June. The only other girl from that same form, Joyce, now sent two of her three choices to this square. A triangle was made by girls coming from another second-year form. There were no stars or isolates on this sociogram.

It was considered that despite the large number of mutual choices the girls of 3A were at a low level of organization. These small, compact groups

were protective groups. Both girls and boys, when thrown together into a new form, sought support of any individuals with whom they were already acquainted. They had not as yet shared common experiences and they had not yet begun to develop value systems personified in a few individuals and based upon a hierarchical social structure.

By January, 1948, few definite changes had taken place among the girls, but the square comprising Pat and Rita, Doris and Edna, had once more separated into two pairs. Apparently the immediate threat from the environment which had caused the formation of smaller compact groups had passed, and re-grouping was beginning around values which would integrate larger units.

In April there appeared among the girls on the first criterion one star, Betty. When three criteria were considered there was another star, Brenda, and an isolate, Rita. A larger group was now developing with the beginnings of a hierarchical structure and girls were being chosen who typified the values of the group. All the small, protective cliques were now breaking down except one, consisting of Betty, Brenda, Mary and Ruth. It was in this group that the two stars were to be found, whilst Mary was a near-star and Ruth received more than the expected number of choices. These four girls received altogether almost half of the total number of choices among the girls. They had become the leading group of girls in the form. Betty herself received almost one fifth of the choices among the girls and could at this time be considered the centre of the values of the group.

The four girls, with Edna, Doris and Joan were the most sophisticated girls in the form. It would appear that this group of four was bound together by a common determination to become young women. Ruth, however, was an exception in that she was a follower rather than a leader. She was less sophisticated and never aggressive towards the staff, and she received fewer choices on the sociometric test. The other three girls were not very interested in school work and often actively disliked it. They were at cross purposes with some members of the staff and were on occasions rather pert, but they were very friendly when treated as persons in their own right rather than as children to be brought to order. Mary in particular liked to be regarded as grown-up and she was frequently absent from school. Brenda was more conscientious and neat and smart in appearance. Betty was excitable, cheerful and always ready to laugh. Following the defeat which they had suffered upon being placed in this form at the beginning of the year this group, and to a certain extent all the girls, needed to feel that they had a full social life which was quite as important as classroom matters.

Betty spent much time in talking vivaciously about their activities outside school and regarded school difficulties with a good-tempered, inconsequential air. She was the very personality to convince them that their group and its interests were the real centre of life, and could help them to feel the sense of community that they needed.

Rita was the only isolate among the girls in April. This was a great contrast to her position as a star in her second-year form in the previous June, but not uncommon for a girl who was active in a childish way in the second form but slow to become sophisticated in the third form. She was tall and thin, and rather self-conscious. It was not until she was in the fifth form that she was confident and mature enough to be again quite popular.

By July the development towards one large group could be seen to have proceeded still further and the leading group had more clearly defined its character. Consisting originally of two pairs, it had in April been a triangle plus Ruth. In July Ruth was completely excluded from this group, and from being a near-star she had become an isolate, receiving no choices at all. The other three girls now sent their choices to Joan, who became a star. Brenda and Mary were also stars and Betty was a near-star. Doris and Edna, two more near-stars, sent unreciprocated choices to Brenda and Mary and could be considered to subscribe to much the same values. This nuclear group of girls now consisted, therefore, of Brenda and Mary at the centre, with Betty and Joan on one side, and Doris and Edna on the other.

It is notable that these six girls, who in April had obtained fifty-six per cent of the choices received by all the girls, now received sixty-four per cent. Their average number of choices was 14.3, whilst the average number received by the remaining girls was 5.4. The average for the three girls who were the original members of this central group, Brenda, Mary and Betty, was 14.7, the highest of all. The remaining girls of the form had no particular organization and there were among them two isolates, as against one in April.

The general line of development had been much the same as that of both sex-groups in form 4C, and in general accordance with the hypotheses. It had not, however, proceeded so far as among the boys of 4C and the structure of the whole group was less stable. The nuclear group was not so well integrated and much re-shuffling of position was taking place within it as values were more clearly defined.

It was apparent that the sophisticated central group formed the most influential body of opinion among the girls of this form. All six girls in this group took a greater interest in films and dancing than did the other

girls. At least four of the six were very friendly with older boys, whilst it is doubtful if more than one other girl in the form had a boy friend. The three original members of the central group, Brenda, Mary and Betty, differed from the other three in that they were more quickly resentful and overtly aggressive towards the staff. All six girls in the group, however, held values which in many respects were in conflict with the purposes of the school. There was, therefore, from the school point of view a poor morale among these girls.

This interpretation of the sociograms was confirmed by an analysis of absentees and leavers, and by the findings of the *Guess Who? Test.*

In form 3A the number of casual absences and the number of individuals leaving before completing the school course was remarkably high. During the year 1947-48 the average number of periods of absence[13] was for every term higher in 3A than in any other form studied. Further, if the three original members of the central group of girls, who were always stars or near-stars on the sociometric tests, were contrasted with the remainder of the girls, they had in each term more than twice as many periods of absence. There was no doubt, from other evidence obtained, that these absences were due not to illness but to poor morale: these girls did not like attending school. (When on one occasion enquiry was made of Brenda regarding Mary's absence, the reply was, "Mary probably just doesn't feel like coming. She doesn't come if she doesn't want to.")

All six girls in the central group left school as soon as they reached the legal school-leaving age. Ruth, who was excluded from this central group as it defined its values, stayed to the end of the course. Of the girls outside this central group, four left before completing the course. This was still a high rate of leaving, but much lower than that of the central group.

When an examination was made of the mean scores on the *Guess Who? Test* of the six girls in the central group and of the remainder of the girls, it was found that the members of this central group were in general considered more talkative and daring, more confident with adults, more popular, more happy and frequently smiling, more good-looking and attractive, more enthusiastic and energetic, and more likely to have older friends.

These findings supported the conclusions already drawn from subjective interpretation of the sociograms, that the girls of 3A were becoming organized around a nuclear group whose members had values derived chiefly from the world outside school and whose principal object was to become independent young women.

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[13] Hallworth, H. J. *Loc. cit.*

It also appeared, however, that in order to conduct relations with the staff, the girls of 3A had been obliged to develop a secondary mode of organization centred around a girl outside the central group. The girl who on the findings of the *Guess Who? Test* was considered the outstanding leader of the class, Jean, had throughout the year received fewer than the expected number of choices on the sociometric tests. Jean received more mentions as having a sense of humor than anyone except Betty, and was considered far more friendly, more sure of herself in class, more confident when talking to adults, and more neat and tidy in appearance than any other girl. Jean and Edna were considered the most popular individuals in the form, but Jean was also considered more bossy than anyone else.

It seemed that Jean could have been expected to appear as a star on the sociograms, and probably this would have happened had the values of these girls been such that they allowed the group to co-operate easily with the staff. They were, however, in process of contracting out of the school group and required this secondary mode of organization in order to conduct their functional relationships with the staff. There was no doubt that this mode of organization was secondary. Jean was popular and a leader "in the class"; she was not an effective leader outside the classroom—in social situations she was merely "bossy" and was never an associate of the other girls.

An individual's role in the group changes accordingly as the function of the group changes. When the function of these groups was to perform school work, Jean was a leader. Sociometric choice among the girls of this form was not, however, determined by ability in school work, even when the criterion was one of working together. Choices were directed according to a set of values represented by the central group of girls. Jean was considered grown up and the groups allowed her to take charge of relations with the staff, but she had not many associates in the peer group.

The hypothesis that groups organize themselves around particular leaders who personify certain values had therefore to be modified. It appeared that groups organized themselves in different ways for different purposes, with individuals changing their roles according to different sets of values. Over a particular period, however, one set of values appeared to be of greater importance than any other, and it was these values which determined the integration of the group and which were associated with its characteristic mode of organization.

In this group of girls in 3A the predominant set of values came from the central group and the characteristic mode of organization was around this

group. There was, however, a secondary mode of organization with Jean as leader, for the purpose of making contact with adults. When the necessity for co-operation with adults had passed the group reverted to its more stable form, and it was from this basis that answers were always given on a sociometric test. The sociograms were always indicative of the characteristic group structure.

It would appear that there was not only a hierarchy of sociometric rank associated with a particular system of values, but probably also a hierarchy of modes of organization associated with a hierarchy of values.

Form 3A Boys

One factor in the environment—the allocation to a non-specialist form—had dominated the development of the group of girls in 3A. It was likewise an important feature in the group development of the twelve boys in this form, but in a different manner.

The first sociometric test in September showed that the boys, like the girls, were organized in small protective groups. By January there had come into existence one large, loosely-knit group of eight boys, and a close group of four. Most rejections passed between the two groups but two boys in the larger group, Smith and Green, were rejected by other boys in that group.

These two groups continued to develop separately throughout the year. In April the larger group was developing a hierarchical structure and contained one star and one isolate. The isolate, Smith, sent several of his choices to the smaller group. One boy in the smaller group had left the school and the remaining three boys sent several choices to the larger group.

The July sociogram, however, showed a large number of rejections passing between the two groups. The tendency for the larger group to absorb the smaller, noted among the girls of 4C and apparently present among these boys in April, had now disappeared. Smith had been well accepted by the smaller group and was no longer an isolate. Inside the larger group there had been a further differentiation of rank. The group was now centred around two of its members, Taylor and Williams, who were the only stars among the boys. Green was an isolate on the edge of the larger group.

Further sociometric tests were given to this form during the following year and these two groups were still seen, with a complete cleavage between them. The failure of these boys to form one large group could possibly be explained by the animosity between Taylor and Williams in the larger group, and the leading pair of boys in the smaller group. A similar phenomenon was noticed among the boys in other third-year forms, however, and it

appeared to arise from two different reactions towards assignment at the end of the second year to an "inferior" form.

The boys in the larger group were more grown up and responsible than those in the smaller group. The former boys, and particularly Taylor and Williams, were serious-minded, quite hard-working, co-operative in school and able to talk easily to adults. The four members of the small group were, by contrast, rather boyish and immature, indulged frequently in horseplay and fighting, and were less able to talk with and respond to adults.

These subjective interpretations were confirmed by the findings of the *Guess Who? Test*. Taylor and Williams were as outstanding on this test as they were on the July sociograms. They received most mentions as being able to work quietly, never causing fights, being grown-up in outlook, neat and tidy in appearance, goodlooking and attractive, and popular. On the sociometric tests from January onwards they had made a triangle with Kenway, and together with him they were now considered the least talkative of the boys and the least likely to try to attract attention to themselves. Taylor received most mentions as being a leader and as being confident with adults, and, with one other boy, as being friendly. The six boys in the larger group all received mentions as being popular, whilst only one other boy received a positive mention on this trait.

Mean scores on each of the twenty-two traits were calculated for the two groups of boys separately. The members of the larger group were considered more able to work quietly, more friendly, less apt to cause fights, more confident in class, less prepared to do anything risky, more neat and tidy in appearance, more able to laugh at themselves, less attention-getting, more confident with adults, and more popular. There was obviously a considerable difference in the way in which the two groups were regarded by the form in general.

The average number of absences per term was calculated for each group separately over a period of two years, 1947-48. With the exception of the autumn term of 1947, when the two groups were in the process of clarifying their values and their membership, it was in every case higher in the smaller group, and in some cases twice as high. This difference was considered to be due to a higher rate of casual absence in the smaller group, and from the point of view of the school it was to be regarded as evidence of a poorer morale.

The situation regarding leavers was at first glance surprising. Of the six boys in the larger group, five left before completing the school course; Williams alone remained at school. Of the four boys in the smaller group, only one left school early. Green, who had been on the edge of the larger

group, had by the following year joined the smaller group and remained at school to the end of the course. Obviously there was a strong tendency for members of the same group to act in the same way.

The contrast between the two groups was not so inexplicable as at first appeared however. The boys in the larger group took life seriously and wanted to get reliable and suitable jobs. They knew they had not been very successful in school work or they would not have been in this form, and they considered that the best thing to do was to obtain some kind of apprenticeship. Such openings were at this time relatively easy to obtain for boys of their age. Of the five boys in the larger group who left school, two who were mutual first choices entered drawing offices. The other three became engineering apprentices; two, Taylor and Kenway, going to the same firm.

There was no evidence obtained from these two sub-groups of more than one mode of organization. The larger group had a value system reasonably coincident with the purposes of the school and had no need to devise special mechanisms for co-operation with the staff. When a form project was suggested it was put forward by Williams, a leader of this group of boys, and Jean, the leader in the secondary mode of organization of the group of girls. The normal mode of organization in this boys' group fulfilled the purpose of the secondary mode of organization in the girls' group.

The boys of the smaller group appeared to have a system of values very similar to that discovered by Tryon[14] among boys of twelve years of age, and they seemed to have a similarly immature level of group organization. There was little evidence that the group had developed any means whereby it could make contact with adults, and it was not until these boys were in their fifth year that any apparent development took place and roles inside the group appeared to become clearly differentiated.

It appeared that like the girls of the form, the two groups of boys were reacting to the defeat of being placed in this form, but in different ways. The larger group of boys was able to develop to maturity inside the school, but only until they were free to leave. The smaller group of boys was taking refuge in regression.

Form 2D Girls

Whilst the members of form 3A had passed through the process of re-allocation at the end of the second year, the members of form 2D had not yet reached it. This impending selection, however, was no less important a factor in the environment of 2D than was the fact of selection in the

[14] Tryon, C. M. *Loc. cit.*

environment of 3A. It was a factor which went far to determine the kinds of values set up in both forms. The development of the value system and of the group structure still proceeded in accordance with the hypotheses set out at the beginning of this study.

In September, 1947, this form consisted of thirteen girls and twenty-one boys who had already been together for one year. One girl, Gillian, entered the form in January, 1948.

The sociogram for September showed no stars or isolates among the girls, but there were two near-stars, Sylvia and Barbara. Every girl made a mutual choice, but there were no groupings either small or large. By January there was one triangle forming part of a long line of mutual choices from which a larger group might arise. This was separated by six rejections from three other girls, Alice, Janet and Hilary, suggesting that a second sub-group might also form.

In April there was on the criterion of seating one star, Sylvia, and one isolate, Gillian. When three criteria were considered there was another isolate, Hilary, and there were two near-stars, Barbara and Margot. The two sub-groups were now becoming well defined. The principal group consisted of Sylvia, Margot, Norma and Mavis, and extended to Anne on one side and Barbara on the other. The centre of this group was Sylvia, who also attracted choices from the girls outside the group. The second sub-group consisted of Barbara, Alice, Janet, and Valerie. Barbara was at the junction of the two groups, with mutual choices passing into both. A third potential sub-group centred around Pamela and Gwen, a mutual pair who had no other reciprocated choices. Rejections went not only to the isolates, but also to prominent members of the sub-groups, particularly to Norma. This was indicative of hostility between the sub-groups which would hinder the growth of one large group.

Soon after this test had been given Barbara asked if she could alter her choices. She now chose Margot, Norma and Enid and in effect, from being between the two sub-groups, placed herself firmly in the larger one. This she did at the cost of breaking her mutual choice with Valerie, which had existed since the previous September. Apparently the larger group was more attractive to a girl who had the option of joining either. Apparently, too, the inter-group hostility was such that Barbara had to make a choice.

On the July sociogram Sylvia was again the one star among the girls, but there was now a third isolate, Gwen. The two sub-groups had further defined their membership and there was a third sub-group in embryo. There were no rejections between girls of the same sub-group, but several passed between the sub-groups.

The largest group contained the same six girls as in April, and also Enid. The average number of choices received by members of this group was 11.7, as compared with 6.0 and 3.3 for the second and third groups respectively. It contained the one star, and five of its seven members were over-chosen, whilst only one other girl in the form received more than the expected number of choices. As a group it received nineteen choices from other groups: the second group received three and the third group none. There was no doubt that the first group could be considered the "leading" group of girls in the form. These girls had apparently formed themselves into a hierarchy of sub-groups.

The principal value of the first group, and of all the girls, appeared to be academic success. Sylvia, the one star, obtained the highest position among the girls in almost all examinations. All the girls in the principal group, except Mavis and Enid, did well in their school work. Mavis and Enid worked hard but had less ability; they were the only girls in this group who did not receive more than the expected number of choices. They appeared to be accepted into this principal group mainly on the basis of their long-established mutual choices with Sylvia and Anne respectively; there was, as it were, a remnant of earlier organization inside the group. At the end of the year all the members of this first group, except Mavis and Enid, obtained places in one of the two specialized forms, and they elected to go together into form 3 Arts. Of the remaining girls only one, Gwen, obtained a place in one of the two selected forms, and she went into form 3 Science.

The second sub-group consisted of Alice, Janet, Valerie and Gwen. All except Valerie sent choices to the central group, and these choices included at least one first choice. Obviously this sub-group felt itself to be in a weak position as compared with the larger group, and it had less cohesion. It could also less easily be accredited with positive values, as in the case of the smaller group of girls in 4C. It appeared to have become a protective grouping, giving support to some of the girls who had not gained acceptance in the larger group.

Three other girls, Pamela, Hilary and Gillian, appeared to be in process of forming an even smaller protective grouping. All were isolates or near-isolates, and none appeared very happy.

Further evidence as to the values held by the girls of 2D was obtained by correlating sociometric ranks with results. The correlation between July sociometric ranks and ranks obtained in the geography examination at the end of the spring term was $+ .597 \pm .17$. Between July sociometric ranks

and ranks obtained on an attainment test in geography compiled by the writer and answered by this form in the same month, the correlation was $+.68 \pm .15$. Both coefficients were significant. Further, mean percentage scores were calculated for each of the three sub-groups. For the geography examination these scores were: first group, 58.7; second group, 38.5; third group, 27.7. For the geography attainment test the scores were: first group, 61; second group, 48; third group, 44. All of these figures lent support to the conclusion that the principal value of these girls was academic success.

The correlation between July sociometric ranks and ranks obtained on the Otis Test of Mental Ability, also given to this form in the same month, was $+.325$. This coefficient was not significant. There was no significant difference in intellectual ability between the first two groups.

Among the girls of 2D the sociometric test gave a far better prognosis of academic success than did the intelligence test. The grading which threatened at the end of the term had resulted in the acceptance of academic success as the highest in the hierarchy of values formed by these girls, and their social hierarchy had been fashioned accordingly. This one factor in the environment had evoked a vigorous response on the part of the group, but the general hypothesis regarding structural development still held good.

An unfortunate aspect of this drive for academic success was the over-competitive situation which was produced between individuals. It was too easily assumed that success could only be obtained at the expense of another member of the form. Co-operation in group work was less easily obtained in this form than in any other.

The other values of these girls appeared not yet clearly defined. Mean scores were calculated for the three groups on each of the traits measured by the *Guess Who? Test*, but the differences between the means were small and there was much overlapping of scores. The leading group was on the whole considered more friendly and less talkative than the other groups. The only three girls mentioned as causing fights came from the second and third groups, and the second group received more mentions than the others as being bossy. The only girls mentioned as being popular and as being leaders were Sylvia, Barbara and Anne, all in the large group. Sylvia, the only star, received most mentions as being friendly, popular and able to laugh at herself, and was one of the girls to receive most mentions as being confident with adults and sure of herself in class. Several girls in the second and third groups received the largest number of mentions on undesirable traits. From observation of these girls in different social situations in later years, however, it appeared that in some instances at least personality traits had

been evoked by the situation in which they found themselves as a result of their academic ability.

There were inside the leading group two secondary values represented by Anne and Norma respectively. Anne received far more mentions than anyone else in the form as being neat and tidy in appearance, and good-looking and attractive. (As among the girls of 4C these two traits were closely related). She also received most mention as liking other people to take notice of her, and she was considered grown-up. Norma received most mention as being childish in outlook, and she was one of the only two girls in the leading group to be mentioned as unattractive. Anne took a keen interest in clothes and in boys. In the July sociometric test she sent one choice to the outstanding star among the boys, this being the only inter-sex choice ever made in this form. Norma was more restrained and less mature, and she appeared to by trying to preserve the unsophisticated nature of the group. She was the only girl in the principal group who did not send at least one choice to Anne in July.

When the members of the leading group entered form 3 Arts in the following year there was a complete re-organization of their group relationships. Maturation, and the removal of the threat of selection, combined to give a new set of values. Academic success was of less importance and a higher value was placed upon the ability to get on well with the boys of the form. For some months these girls held together as a group but Norma moved further and further towards the edge. She eventually left to attend a private girls' school, in which she was happier. The new environment suited Anne, and in July, 1949, she was a near-star at the centre of the leading group of girls. Sylvia, however, was at a disadvantage. She was less at ease with the boys of the form than were most of the girls, less sophisticated, and frequently at this time appeared lost and awkward in her behavior. She was much more self-conscious and less sure of herself in class than she had been a year earlier, and had become a near-isolate. It was not until there had been another shift of values that she again received more than the expected number of choices in May, 1950.

Another girl whose social status changed during her later school life was Alice, a member of the second group. In this case again there appeared to be a close relationship between group membership, personality traits and academic ability. Although one of the two most intelligent individuals in 2D according to the Otis Test, she failed to obtain a position in a specialized form at the end of the year. This was very possibly due to the fact that academic success was not regarded as sufficiently important and was not

expected among the girls of the second group. In the situation in which she found herself in 2D, Alice was very bossy, and she was a gossip who tended to malign other girls in the form, therefore she was unpopular. Whether these traits were the result or the cause of her non-acceptance by the leading group is open to question. It appeared, however, that as the year progressed the members of the principal group forced Alice into a role which included lack of success in school work, that they convinced her that she was not very successful academically and, in effect, prevented her from obtaining a place in 3 Arts or 3 Science. In her new form during the following year Alice became quite popular. She was the leader of the new group of girls, and always ranked first or second in examinations.

Form 2D Boys

The group development of the twenty-one boys in form 2D was similar to that of the girls insofar as, in response to the same factor in the environment, their principal value was again academic success. It differed, however, in that instead of forming a hierarchy of sub-groups they developed one large group, hierarchical in structure, and having secondary modes of organization.

The sociogram for September showed one isolate among the boys, Bradley, and one star, Warren. One square was visible, possibly the centre of a larger first-year group which had broken down during the summer holidays.

By January there was again one isolate, but there were now three triangles, one square and one circle. There appeared to be two centres from which larger groups might grow. One was from Warren and Irwin, who were already at the centre of a loosely-knit group. The other was from Hill, Baker and Moor, who at this time were the boys receiving most choices at the centre of a smaller but better integrated group. Rejections were directed not from one group to the other, but to particular individuals.

On the April test there was on the first criterion one star, Warren. Using three criteria there was another star, Hill, and five isolates. Baker, Moor and Irwin were near-stars. On each of the sociograms the two embryo sub-groups appeared, with Warren at the centre of one and Hill at the centre of the other. However, both Warren and Irwin sent choices to Hill on the criterion of working, and Hill was a star on this one sociogram. Again the rejections went to isolates only. It appeared that the boys of this form were unlikely to divide into two sub-groups. They would more probably become centred around one group with two modes of organization according to the two sets of values represented by Warren and Hill respectively. Warren was

the outstanding athlete and games player. Hill was outstanding academically. Both are quite friendly and sociable.

Group development had now proceeded a long way since the previous September, but there could be no large, stable group centred around one or two personalities until some tacit decision had been arrived at as to what values were to unite such a group, athletic prowess or academic ability. The pressure from the environment, in the form of the grading which was to take place at the end of the year, weighed heavily in favor of academic ability as the principal value.

The July sociometric test showed some significant changes. There were now three stars, Hill, Moss and Fox, of whom the last two had not been stars in April. Baker was again a near-star. On each criterion Hill, Moss and Baker made a triangle, whilst Fox made a mutual choice with Hill and received a choice from Baker. These four boys received between them more than one third of the choices going to all the twenty-one boys. All four appeared to have two traits in common: a will and ability to do well in school work, and a certain friendliness and lack of aggressiveness towards other boys.

Warren was on this test still one of the only two other boys to receive more than the expected number of choices, but was not even a near-star. Being attached to Moss by a mutual choice on each criterion he could be considered as another member of this nuclear group. He also was quite successful in school work. However, it was apparent that of the two modes of organization noticed in April, one had now superseded the other. Athletic ability was not now so highly regarded; the dominant value among the whole group of boys was academic success. Both Hill and Fox received more choices on the criterion of working than on any other criterion, as also did Baker.

This nuclear group was not so well integrated as the nuclear groups among the boys of 4C and the girls of 3A, nor indeed as that among the boys of 1C. This was considered to be a reflection of the fact that the nuclear group of boys in 2D was of relatively recent origin, and representative of values imposed upon the form. It appeared to be the product of a reaction to an emergency caused by pressure from the environment, rather than the result of slow growth in stable conditions.

At the end of the year all five boys in the nuclear group, and also one other boy who was over-chosen, gained places in either 3 Arts or 3 Science. Of the remaining fifteen boys, only two obtained places in 3 Science, the other thirteen boys going into either 3A or 3B.

Comparison was made between the mean scores on the *Guess Who? Test* of the five boys in the nuclear group and of the remaining boys. From these it appeared that other values held by the boys of 2D and centred in the nuclear group were friendliness and good humour, a happy and smiling disposition, a certain lack of aggression towards others and an ability to work quietly. There was evidence, however, that the distinction already suggested between Warren and the rest of the nuclear group was recognized by the peer group. All boys in this group except Warren and Fox were mentioned as being afraid to do anything risky and as being inactive in games. Warren was mentioned as daring, and he received far more mentions than anyone else in the form as being active in games.

One boy, Moor, held an exceptional position. On the July sociograms he received only the expected number of choices, but on the *Guess Who? Test* he received most mentions as being popular, and by far the greatest number of mentions as being a leader. It was considered that, like Jean among the girls of 3A, he was the centre for a secondary mode of organization among the boys of this form. The situation here, however, was the reverse of that found in 3A. Among the girls of 3A the characteristic mode of organization was associated with values derived from outside the school and with aggression towards the staff; Jean was the centre of the group when the girls were organized to co-operate in the purposes of the school. Among the boys of 2D the dominant values had been decided by the grading of the form which was to take place at the end of the year and, as far as academic work was concerned, the form could co-operate with the staff if not with each other. Group work among the boys of 2D during the summer term had revealed much latent hostility between individuals. Their problem was the same as that facing the girls: as the situation was presented to them, the academic success which they desired could only be obtained by successful competition against other members of the form. This produced a certain undercurrent of rivalry and antagonism which occasionally was directed by the less successful individuals against members of the staff. There was here the need for a secondary mode of organization, which had become centred around Moor.

It was in the following year when he had failed to gain a place in a specialized form that Moor became over-chosen on a sociometric test. He was then in the position of the stars among the girls of 3A, the centre of the dominant mode of organization among the boys of his form, and associated with values directed against the staff.

Possibly there is commonly found in classroom groups an ambivalent

attitude toward external authority represented by two modes of organization. If so, it would seem that the organization of the school goes far to determine which attitude is to be dominant. In the studies here reported however, whether the dominant values were derived from or in opposition to those of the larger organizations, the development of the group appeared always to follow a pattern similar to that suggested by the hypotheses.

Form 1C.

Since form 1C was a group which in September, 1947 met for the first time, it provided an example of group development from its earliest stages. Since, further, it was divided into sex-groups, it provided in effect two groups which, although they had many common elements in their development, yet made a sufficient contrast to throw into relief those features which have already been observed in other forms and which could possibly be regarded as fundamental tendencies in the development of most groups. The studies of both sex-groups are here reported in summary.

The form consisted of eighteen boys and fourteen girls, who at the time of the first sociometric test in September had no common values and no sense of unity. Many choices were not used and there were no large structures. There were, however, no isolates and every member of the form was a member of a mutual pair. There was little spread of choices.

The girls' group, however, had one star, Marlene. The members of 1C did, of course, bring with them the values they had learned in former groups, and certain of these values are common throughout the larger society. Marlene almost certainly represented values derived from the larger society and connected with an above-average socio-economic status which these girls presumed to be of importance in this school. Being themselves without values as a group, and being therefore individuals in a state of uncertainty, they adopted temporarily those values from the adult community which seemed most relevant to their situation.

An additional sociometric test was given to this form in November, 1947, when it was found that in both sex-groups almost all choices were being used. There were more mutual choices and there were now some larger structures. Indications were present of the first attempts to form sub-groups, but there were neither stars nor isolates. Two individuals, however, failed to make a mutual choice.

By January this process had led to many changes in both boys' and girls' groups. Developments had proceeded furthest among the boys, where the concentration of choices towards certain boys had led to there being a greater extreme range of sociometric status and no increase in the number

of mutual choices. There was now one isolate among the boys—one of the first signs of a greater differentiation of rank as values were clarified and centred upon some individuals, whilst others became identified with negative roles. The larger number of rejections concentrated upon two boys was further evidence of the same tendency to identify individuals with certain values, either positive or negative. Among the girls the attempt to form several small sub-groups had led to still more mutual choices, but the groupings were changing rapidly.

The April sociograms showed that the boys had progressed to the formation of one large group with one set of values centred in a nuclear group of four, and in one boy, Lee, in particular. This central group was not yet, however, very well integrated. Using three criteria there were now two stars and two isolates among the boys, and owing to the concentration of choices upon a few individuals there were proportionately fewer mutual choices than in January, a still greater extreme range of sociometric status and a still more positively skewed distribution curve. A triangle of boys was separated from the larger group. The girls had made less progress and still formed only two sub-groups, with many miscellaneous choices.

By July there were five stars and five isolates in the form as against two and three in April. It was found that the same line of development had been followed still further by the boys. The nuclear group received more choices than ever, and Lee, who had been a star in April, also received more choices than previously. The development of this group of boys had fully substantiated the hypothesis that more and more choices could be expected to go to fewer and fewer boys as the group continued to develop and as its values were progressively centred upon fewer individuals. The values represented by the central group were friendliness, enthusiasm, ability to get on well with older boys and with adults, a sense of humor and ability to take a joke, a happy and smiling disposition, good looks and attractiveness, and a general restless activity. Negative values were listlessness, lack of a sense of humour and inability to take a joke, extreme personal untidiness, and physical aggressiveness towards other boys. A separate triangle of boys still existed, but it was apparent that the main tendency throughout the year had been towards the development of one large group, with a hierarchy of status and possibly a hierarchy of values.

As far as could be determined, the values most highly regarded by the girls of form 1C were friendliness, ability to work quietly, neatness and tidiness, good looks and attractiveness, a grown-up outlook, and assurance with

adults. Negative values were listlessness, physical aggressiveness towards other girls, and personal untidiness.

It appeared that these girls had been unable to form one large group with such values because the one girl who could have acted as the centre, Beryl, showed little interest in making close associations with other girls in the form. All her attention was at this time taken by groups outside the school and it was not until two years later that she became a member of a nuclear group. The one star among the girls at this time was not connected with any sub-group and proved to be of no more than transitory importance. It was never found that an individual without the support of a nuclear group could personify the dominant values of a larger group. The girls of 1C were following a pattern of development analogous to that followed by the boys, but with less success in that they were still searching for stable values and for a suitable personality in whom those values could be centred. The boys during the following year maintained and developed their one large group, but among the girls there was a considerable regrouping.

Conclusion

It is considered that the hypotheses relating to group structure and development, set out at the beginning of this article, were in general substantiated by the findings which resulted from the sociometric case studies of the groups reported above. Supporting evidence was obtained from studies of other groups, of which details have not been given here.[15]

The existence of relatively stable groups inside each form was shown by means of sociograms, and these groups were at any one time much the same on the three criteria used. Groups were shown to be associated with value systems, which could be either opposed to or coincident with the values held by the staff, the former groups having a high proportion of absentees and leavers. The distribution of sociometric choices was almost always positively skewed, and the values of the groups appeared to be centred upon those individuals who were over-chosen on the sociometric tests.

It was found possible to trace what could be regarded as the "normal" process of group development. There was a tendency to make progressively larger and better-integrated groups. This was followed from the beginning in the group of 1C boys, and was also traced among forms 4C, 2D and 3A. There was a growth from mutual choices, through small or loosely-knit structures, to a large group centred around a nucleus of some four or five

[15] Hallworth, H. J. *Loc. cit.*

individuals, one of whom was particularly over-chosen. The group appeared always to form around certain values which were recognized by its members, and which were represented by the nuclear group and in the evident cases by the one individual in particular.

The groups which followed the "normal" process of development could perhaps be considered to have been the most fully developed groups which were studied. As such they sometimes showed another characteristic not foreseen in the hypotheses, in that they appeared in certain cases to develop secondary modes of organization centred around different individuals. This suggests that all the well-developed groups had several modes of organization which remained unnoticed, or alternatively, that they possessed two modes of organization to provide for the ambivalent attitude of the group members towards external authority.

In some instances also, it was noticed that when attention had been centred upon a nuclear group and upon one individual in particular, the nuclear group continued to attract still more choices whilst the one individual received fewer. This suggests the possibility that whilst values are at one stage of development centred in one star, they may, when they have been disseminated among the larger group and a stable structure has developed, become centred instead in several individuals.

It is not considered that the normal process of group development in the forms observed necessarily took a long period of time. All of the large, stable groups reported above did, in fact, form slowly over a period of one year or more, and persisted for a further period of one or two years. There were cases, however, in which development took place much more rapidly in response to a specific stimulus from the environment. In these instances the group was centred around values which were of immediate but less permanent significance to its members, and the group itself generally had a shorter life history.

Interruptions of the normal process of development occurred in several ways. The girls of 1C, for example, appeared unable to find a suitable individual in whom to centre their values and were unable to integrate into a larger group. It sometimes occurred that members of a group appeared to clarify their values and obtain greater cohesion by emphasizing their differences from other groups and by limiting their membership. This appeared to happen among the girls of 2D and had possibly occurred among the girls of 4C a year previously. In 2D it produced a hierarchy of groups with one "principal" group, rather than one large structure with a nuclear group. In both 2D and 4C, however, there was a tendency, with the passage of time,

for the principal group to become less exclusive. In some cases again, as among the boys of 3A, the large sex-group was divided into two sub-groups, both of which held positive values and neither of which began to absorb the other.

Wider investigation would be necessary to establish whether the generalizations drawn from the study of this limited number of children's groups can be considered to apply also to other groupings.[16] Further, the acceptance of these hypotheses would raise many other questions, concerning, for example, the variations of the normal process of development, the conditions under which secondary modes of organization are developed, and the means whereby group integration may be preserved without the formation of too rigid a hierarchical structure. Further study might suggest that groups commonly divide into two sub-groups with different sets of values, and that girls' groups are generally smaller than boys' groups.[17] Questions arise as to the cause of the skewed distribution of sociometric choices and the leptokurtic distribution of scores which was found on the *Guess Who? Test*.[18] Are these phenomena evidence of a tendency of the group to develop towards a fixed structure and to fix its members in specific roles, and if so, in what respects can the group be considered to determine the personalities of its members? It would seem that further investigation of these problems could provide the basis for wider generalizations of a psychological nature.

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[16] For an account of the development of similar structures in college groups see Vreeland, F. M., "Social Relations in the College Fraternity," SOCIOMETRY, Vol. V, No. 2, May, 1942. Pp. 151-162.

[17] For an example obtained in a school of two hundred and fourteen boys and girls between the ages of eleven and fourteen years, see Shukla, J. K., A Study of Friendship Among Adolescents. P. 64. M.A. (Education) Thesis. University of London Library, 1948. Also in Fleming, C. M. (ed.), Studies in the Social Psychology of Adolescence. P. 192, Table II. London: Routledge, 1951.

[18] For references to leptokurtic distributions which describe certain forms of social behaviour see Garrett, H. E., Statistics in Psychology and Education. Third edition, 1947. Pp. 129-132. London: Longmans.

A DEMONSTRATION OF THE POSSIBILITY OF USING VECTOR-THEORETICAL FORMALIZATIONS IN THE SOCIOMETRIC ANALYSIS OF THE INTER-TEMPORAL CHANGES OF CHOICE ATTITUDES

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INTRODUCTION. SOME METHODOLOGICAL PROBLEMS IN STABILITY INVESTIGATIONS

As soon as we wish to draw practical conclusions from sociometric investigations, i.e. as soon as we approach the field of *applied sociometry*, we ask such questions as the following: How great stability can we allow in the attitudes of the individuals (pupils, co-workers, etc.)? Do they change from day to day or are they maintained to a certain degree? Of what kind are the changes that we have to anticipate?

In several sociometric investigations the research workers have been interested in the question of stability, and in these cases most often the traditional methods of correlation have been used. In some cases the word "reliability", very often misused in psychology, has been used rather vaguely. The meaning of "reliability" as applied to sociometric tests has been discussed and clarified by Criswell, Pepinsky, Harmon, Jennings, etc.[1] The coefficients, obtained by correlations between test results at different times for the same population, are not regarded, in any of these observations, as a measure of the goodness, the reliability of the test, but as a measure of the stability of the choice behavior. The test reliability is either regarded as self-evident or is referred to examination of another kind. On the other side it is clear that the stability of the choice behavior by itself is of great importance to the prognostic value of the investigations.

By way of general criticism of many sociometric investigations of stability, it may be remarked that too often the investigators have contented themselves with only correlating—and not seldom with correlating only one variable (usually the number of received choices). As this variable may be

[1] Cf. Criswell, Joan H.: Sociometric concepts in personnel administration. SOCIOMETRY XII (1949), p. 283-300; Pepinsky, Pauline Nichols: The meaning of "validity" and "reliability" as applied to sociometric test. Ed. and Ps. M. IX (1949), p. 39-49; Harmon, Lindsey R.: A note on Pepinsky's analysis. . . , Ed. and Ps. M. IX (1949), p. 747; Jennings, Helen H.: Leadership and isolation. 2nd ed., New York 1950, p. 31 etc.

constant, even if other sociometric variables (e.g. the number of received rejections, the number of given choices and rejections, the number of reciprocations etc.) vary, this method of investigation is not to be recommended. And as the relative position of the individual, expressed through the number of given choices and the number of received choices (and rejections), may be constant, even if the directions of the single choices are changed, the changes of single choices should also be analyzed. In order that an investigation of stability should be as productive as possible, the following procedure should be carried out:

1) Stability correlations should be elaborated for several different variables. The one-dimensional analysis is thus expanded to a multi-dimensional one.
2) The changes of the single choices should be analyzed (Thereby reciprocated and non-reciprocated, first-choices, second-choices, etc. are best analyzed separately).
3) Lastly, an investigation should be held to determine in what directions the general sociometric position of the single individual is changed.

A stability investigation of this kind may be of greater value with such a final investigation into single choices and single individuals: In the first place, a clearer picture is obtained of what is constant and what is not, and secondly there is the possibility of throwing light also on the specific character of the changes which have occurred. Thereby we might go from the problem "constant—not constant" to the by no means unimportant question of the inner dynamics of the instabilities.

Vector-Theoretical Formalizations as an Aid in the Sociometric Analysis of Inter-Temporal Changes.

Theoretical Discussion.

In the analysis of the empirical inter-temporal changes of single choice attitudes it may be of great interest to look at these instabilities in their relation to other factors, e.g. the degree of reciprocation. To make clear the importance of the sociometric choices to the individual and to illustrate the dynamics of the choice process it is often suitable to make use of—in applicable parts—Kurt Lewin's formalization with reference to the concept of vector, performed in different papers.[2] For the sociometric choices may be

[2] See e.g.: Lewin, Kurt: Environmental forces in child behavior and development (A dynamic theory of personality, New York 1935, p. 66-113, esp. p. 80 seq.). *Idem:* The psychological situations of reward and punishment (*op. cit.* p. 114-170, esp. p. 118-

—with certain reservations—taken as expressions of *the field forces about an individual,* i.e. the field forces may be defined operationally as identical with or revealed by the wishes, expressed in the sociometric choice (the wishes may very well be interpreted as tendencies to locomotions; cf. the following). Let us suppose, that a person A chooses another person B in a sociometric choice. Vector-theoretically this may be expressed thus: a force f is acting on the person A in the direction of B. This may be formalized: fA,B (in conformity to Lewin's general formula fP,G—a force acting on the person P in the direction of the goal, G.[3]). Compare the survey in table 1 (mom. 1a)! With this formula we have an expression for the position of A. From the viewpoint of B we might speak about a *potential force,* as a suggestion symbolized (f), acting on B in the direction of A, i.e. (f)B,A (cf. the table, 1b). The wishes of A as to B do not necessarily have any direct meaning for B, do not directly influence him, but *if* the attitude of A is revealed to B, *if* it enters his psychological field, it may give A a positive goal value. Thus the cases, in which a person B from having been indifferently (or negatively) set against another person A, who has given B a choice, at a later opportunity shows a positive attitude against A, may be described in vector-theoretical terms.

A mutual choice between A and B means from the viewpoint of A an actual force acting on A in the direction of B and a potential force acting on A in the same direction, i.e. from the viewpoint of A f(f)A,B. From the viewpoint of B we get a similar situation: f(f)B,A (cf. the table, mom. 3). The vector-theoretical probability that A and B will form a constant group is then to be supposed to be greater, when the sociometric test reveals the vector constellation f(f)A,B and f(f)B,A than when we only find fA,B and (f)B,A or (f)A,B and fB,A.

If the person A gives the person B a rejection in the sociometric test, if he thus expresses his wish not to have B as a co-worker etc., this may be expressed vector-theoretically as a force f, acting on A in the direction away from B. The formalization here will be: fA,—B (in conformity with Lewin's general formula: fP,—G). From the viewpoint of B we may in this case speak about a potential force, acting on B in the direction away

130). *Idem:* Principles of topological psychology, New York 1936, chapters X, XVII. *Idem:* Field theory in social science, ed. New York 1950, chapters: Formalization and progression in psychology, p. 1-29; Frontiers in group dynamics, p. 188-237; see, J. L. Moreno, Who Shall Survive, p. 169 and p. 205-6, Concept of Social Gravitation, Beacon House, 1934 and 1953.

[3] Cf. e.g. Lewin: Field theory in social science, p. 203.

from A: (f)B,—A (cf. the table, mom. 4). Such a negative potential force may be reinforced by an actual force in the same direction. We then obtain a mutual rejection, which from the viewpoint of A is expressed f(f)A,—B and from the viewpoint of B f(f)B,—A (cf. the table, mom. 6). Here the vector-theoretical probability for inter-temporally constant rejection should be relatively greater than in the one-sided rejections. But the negative potential force may also be weakened by an actual force in the opposite direction. If thus, as said above, A rejects B, but B at the same time gives A a choice, we obtain from the viewpoint of B one actual force, acting on B in the direction of A simultaneously with one potential force, acting on B in the direction away from A (cf. the table, mom. 8a). This is most simply expressed as a potentially restraining force against B's tendency to move towards A, i.e. (rf)B,A (in conformity with Lewin's general formula: rfP,G). From the viewpoint of A we may in this case speak about a potentially restraining force against A's locomotion from B, i.e. (rf)A,—B (cf. the table, mom. 8a).

So far only very simple cases have been discussed: only two individuals, only one degree of strength of the field forces, only one point of time. Several *degrees of strength* may easily be denoted by the use of numbers.

TABLE 1.
SURVEY OF SOME VECTOR-THEORETICAL FORMALIZATIONS OF INDIVIDUAL SOCIOMETRIC POSITIONS

	a) from the viewpoint of A	b) from the viewpoint of B
1. A chooses B	fA,B	(f)B,A
2. B chooses A	(f)A,B	fB,A
3. A chooses B, and B chooses A (mutual choice between A and B)	f(f)A,B	f(f)B,A
4. A rejects B	fA,—B	(f)B,—A
5. B rejects A	(f)A,—B	fB,—A
6. A rejects B, and B rejects A (mutual rejection between A and B)	f(f)A,—B	f(f)B,—A
7. A chooses B; B rejects A	fA,B & (f)A,—B or (rf)A,B	fB,—A & (f)B,A or (rf)B,—A
8. A rejects B; B chooses A	fA,—B & (f)A,B or (rf)A,—B	fB,A & (f)B,—A or (rf)B,A

The strength of a force may be defined operationally as corresponding to the degree of preference, expressed in the sociometric choice. If the individual is allowed to choose five comrades in order of preference, his first choice is marked f_5A,B, his second choice f_4A,C, his third f_3A,D etc., whereby the potential forces acting on B,C,D . . . receive a corresponding symbolization: $(f)_5$B,A; $(f)_4$C,A; $(f)_3$D,A, etc. The vector-theoretical probability for inter-temporal change should be the smaller the stronger the force is.

With this symbolization we may easily obtain a formula for the total "social atom" of the individual. Let us assume—for the sake of simplicity—that the individuals are allowed two choices each, and that A chooses B in the first place and C in the second place. Moreover A is chosen by B in the first place but receives also a rejection from C. A's position may then be primarily described thus:

$$f_2\text{A,B} \;\&\; f_1\text{A,C} \;\&\; (f)_2\text{A,B} \;\&\; (f)\text{A,—C}$$

This formula may be condensed in the following way:

$$f_2(f_2)\text{A,B} \;\&\; (rf)f_1\text{A,C.}$$

From such a *vector-theoretical formula for the sociometric position of an individual* we may also deduce the *most probable resulting force* (Lewin: f^+P,G), which in our case (as f_2A,B $>$ f_1A,C and (rf)A,C but not (rf)A,B is a true judgment) may be supposed to be a force acting on A in the direction of B but away from C, i.e.

$$f^+\text{A,B} \;\&\; f^+\text{A,—C}$$

Empirical Verifications of the Vector-Theoretical Hypotheses

Empirical verifications of the vector-theoretical hypotheses now discussed should be tried in the analysis of the inter-temporal changes of choice attitudes. This paper is intended to be only suggestive, yet although our empirical material is relatively scanty, we will shed light on some results.

In Table 2 we read some results from the analysis of single choice changes in two school classes: B (Boys, 10 years) and G (Girls, 13 years). In each class there had been three sociometric investigations about co-workers: one in March, 1950, one in June, 1950, and one in March, 1951. The three investigations in the boys' class are symbolized by BI, BII and BIII, in the girls' class by GI, GII and GIII. At every investigation the pupils answered exactly the same questions. Among those the most important were: "A. If you had the opportunity to choose three co-workers, with whom to work in a group, which three would you like to choose?

Why? . . . C. Perhaps there is in your class one or more in addition to those already mentioned whom you would very much like to have as co-workers. If so, write down his (her, their) name/s/ here. D. All do not like to work together with the same people. Perhaps there is in your class one or more you would not like to have as co-workers. If so, write down his (her, their) name/s/ here."

TABLE 2.

ANALYSIS OF DIFFERENCES OF THE INTER-TEMPORAL STABILITY AT DIFFERENT DEGREES OF PREFERENCE

Choice	BI/BII		GI/GII		BII/BIII		GII/GIII	
	N	QI	N	QI	N	QI	N	QI
4	25	23 (92%)	24	22 (92%)	17	13 (76%)	24	19 (79%)
3	25	21 (84%)	24	20 (83%)	20	13 (65%)	24	18 (75%)
2	22	10 (45%)	23	16 (70%)	20	13 (65%)	23	13 (57%)
1	62	20 (32%)	84	38 (45%)	50	23 (44%)	79	38 (48%)

In Table 2 first-choices are denoted by 4: four-point-choices, second-choices by 3: three-point-choices, third-choices by 2: two-point-choices. All other choices (answers to question C above) are regarded as one-point-choices and denoted by 1.

When we analyze the results from BI and BII we see that after three months 23 of the 25 first choices are still maintained as choices of the same persons (Q.I.=qualitatively identical cliches, but only first choices). 92% of the first choices are thus qualitatively identical after three months in class B. We find the same percentage in class G after the same time. After nine months we find 76% of the first choices maintained in class B, 79% in class G. The systematic differences of stability at different degrees of preference are the most interesting factors from our point of view. In the case of class B we should note the following percentages: after 3 months, first choices 92%, second choices 84%, third choices 45% and fourth choices 32%. We find practically the same series of falling numbers in class G after three months and in both classes after nine months. Thus an unequivocal verification has been won for the vector-theoretical thesis, that the inter-temporal stability should be greater, when greater force is brought to bear, i.e. when choice intensity is greater. This means also an important verifi-

cation of the correctness of differentiating at the computations between different degrees of preference. A first choice is dynamically something different from, something more than a second choice, a second choice is something different from, something more than a third choice, etc. Also we often see that the changes are of a specific character: when a first choice is changed, it has most often been transformed into a second choice; when a one-point choice or a rejection is changed, it will most often be into an indifferent attitude. We see that the dynamic changes are not abrupt but continuous, which also suggests that the grading of the choice series has been more than verbal.

Can it be shown that the reciprocated choices are more constant than the non-reciprocated? If so, this would verify the hypothesis that a received choice is to be regarded as a potential force acting on the person in the direction of the chooser. In many cases it is difficult to find this: the choices are often very constant, even when no reciprocation is to be seen. An analysis of one-point-choices is of special interest in this connection, since these choices indicate only weak preference. Is this preference better maintained, if the choice is positively reciprocated? To answer this question we investigated the number of the one-point-choices which were positively reciprocated and the number of those which were not; subsequently the choice stability was examined for both categories. For both our school classes and both comparisons (I/II and II/III) together we got the following results: of the 177 unreciprocated choices 70—or 40%—were constantly positive; of the 98 reciprocated choices 49—or 50% were constantly positive. Although the difference is relatively small, this corroborates to a certain degree our general hypothesis. In a similar manner we determined whether the reciprocated rejections were more constant than the one-sided rejections. This examination could only be made in class B, since no mutual rejections were found in class G. If both comparisons are taken together, we receive the following figures: of 18 negatively reciprocated rejections 14—or 78%—were constantly negative; of 52 one-sided rejections 19—or 37%—were constantly negative. That here we may rightly speak of a potential negative force which has contributed to the stability of the rejections seems quite probable. Some of the one-sided rejections were moreover positively reciprocated: here we could also speak of a restraining force operating against the tendency of the rejectors to move from the rejected.

Thus we may say that the vector-theoretical hypotheses discussed above have been verified in several cases. Hence, in these respects at least, the vector-theoretical description may be regarded as a productive interpretation of the sociometric choices.

PROBLEMS IN THE MEASUREMENT OF INTERPERSONAL COMMUNICATION IN AN ONGOING SITUATION*

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INTRODUCTION

The writer is currently engaged in a project (1, 2) which is investigating the conduct of team or group research in the nation's several thousand research laboratories. The project phase with which he is most directly concerned is that involving field studies of research group activity in a number of industrial research organizations across the country. The procedure of this phase entails an intensive investigation of the interpersonal communication practices of selected research groups or teams (2-4 professional workers)—their communication among themselves and with supervisors, supporting personnel, intra-company and extra-company services, and other information sources available to them.

The premise on which this phase of the project is based is that the effective solution of research problems by groups or teams organizationally designed for that purpose is highly dependent on the *availability* and *utilization* of channels of interpersonal communication for the transfer of information. Despite the intellectual resources of the group members and the facilities available to them, group problem-solution may be highly ineffective without adequate flow of information to and between group members.

This viewpoint, relating the flow of information between "elements in a communication network" (people and sub-groups in an organization) and the effective solution of research problems, implies two basic tasks. The first of these, to which the current series of studies has been addressed, is that of identifying critical characteristics of this communication network and putting them into such form that verifiable hypotheses can be constructed which will successfully predict the desired criteria of "effective problem solution". The second task is of course the development of criteria of effectiveness for the solution of research problems. This second task is currently being attempted by a group at U.C.L.A. (3) also working under contract with the Office of Naval Research.

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Some Working Definitions

For communicative ease between reader and writer, it is advisable to establish several rather specific notions of the general concepts with which this paper is concerned. Accordingly, we shall mean by the terms:

Measurement: A process whereby 1) certain relevant characteristics of a phenomenon we are discussing can be identified and classified into mutually exclusive and exhaustive categories, 2) numerical values or discriminatory attributes can be assigned to these categories, and 3) verifiable hypotheses can be constructed and tested, using the assigned values or attributes.

Interpersonal Communication: A process whereby information is transferred by whatever observable or reportable means, between individuals and/or groups (where an individual or group may be the author of a book or a report). This notion is more restricting in a sense than that of "interaction" which the writer and his colleagues have used in recent field studies and teaching of measuring group behavior. The notion of "interaction" encompasses all stimulus-response contacts between individuals without initial reference to a specific goal, whereas "information transfer" is considered to have occurred only when such transfer is considered to have contributed toward a specific goal. This restriction necessarily eliminates from consideration the common usage (4, 5) of "communication" to describe all the downward, upward, or horizontal flow of ideas and data in an organization without reference to a specific problem which generated the need for particular types of information.

Information: Identifiable contributions of facts and ideas toward the solution of a given problem. At this stage of the research, the criterion inherent in the definition can only be developed from reports by the receiver of the information. Whatever measurement is done on information transfer will depend on empirical categories and values or attributes developed from such reports. The ideal of an objective measure of information described by Weiner (6) and Shannon (7) as "choice among alternatives" may not be realized in this area of cooperative problem-solving until a particular problem can be analyzed by an observer in terms of the minimum amount (or level) of information necessary to carry the problem through from formulation to conclusion. This minimum amount of information necessary is not, of course, independent of the information already stored in the memory mechanism of the research worker. For this reason, we may never know what this minimum amount of information is for a particular individual, as we would in the case of the digital computer. An approximation to this ideal may

gradually be made in this area by a gross characterization of an interpersonal communication event as containing a "bundle" of information or, alternatively, as "containing or not containing" information according to a criterion established independently of the receiver of the communication.

On-Going Group: A mature, human organization which was in existence before the start of such field work as is described in this paper, and whose primary objective is not related to the pursuit of this field work. Additional implications include business as usual (or as much as usual as possible in view of the disturbance caused by the field work), no offering of incentives for participation in the field work, and minimum feed-back to the subjects of the findings of the field work during its course. This on-going group is in contrast to the artificial type of group which is set up in the investigator's laboratory for the purposes of study.

Communication Network: The structural and operating characteristics of an on-going group which describe the way in which information is transferred between elements (individuals and sub-groups). Structural characteristics include number and kind of elements in the network; communication media available; social, organizational, and physical distance between elements, etc. Operating characteristics include rates of message flow, proportion of messages received over the network which contain information for the recipient, etc. Implied in this definition of the communication network are: 1) A functional sup-grouping of individuals; in the present study, these sub-groups are problem-solving groups (research teams) of 2-4 professional workers. 2) A mature (essentially stable) pattern of communication among the individuals and sub-groups of the organization and between these elements and information sources external to the organization.

In the present study of team research, emphasis is placed on only one or two elements in each of the communication networks (industrial research organizations) studied; these elements are specific problem-solving groups (research teams). The network characteristics of interest at this stage of the investigation are those which are directly related to the flow of information to or between the members of these problem-solving groups.

Statement of the Field Problem

Three Major Tasks

Identifying and describing the characteristics of the communications network upon which the research team depends for the required flow of information entails: 1) Identification of the members of the problem-solving group (research team). 2) Identification of the channels of communication

available to the group for exchange of information among themselves or between themselves and all external individuals and groups, and 3) Measurement of the utilization of the specific channels of communication available to members of the problem-solving group in terms of frequency of use, types and amount of information transferred, sequence of use, direction of flow, preferred channels, and other variables involved in the operation of a communication network.

Identification of the Problem-Solving Group

The criterion mentioned in the preceding section will provide the operations for identifying the problem-solving group:

> "all individuals who are directly engaged in the intake and utilization of information for the purpose of bringing the current problem to a conclusion."

In most physical research situations, responsibility for the solving of research problems is assigned to professional workers; generally non-professional technicians or assistants are assigned to help them in this work. Each laboratory has a criterion for distinguishing between professional and non-professional workers, although this definition varies somewhat between laboratories and industries.

Directly engaged requires that organizational responsibility and facilities have been assigned to an individual or group; a fellow scientist who "stops by to give a hand" may make the contribution of information which results in a solution, but he does not qualify as a member of the group.

Intake and utilization requires that the individual not only receive information (which may not arrive in the form of interpersonal communication—it may be taken in from his own experience), but also that he apply it directly to the problem; a technical assistant may spend all of his time gathering data—taking in information—but he fails to qualify if he does not utilize himself in the solution of the problem.

Bringing to a conclusion requires, at the present stage of investigation, that the group members and their supervisors are willing, respectively, to submit and receive a given solution or solutions to the assigned problem and consider the job completed. For the present also in lieu of an *a priori* estimate of the minimum amount of information required to solve a given problem (which might be provided by application of mathematical information theory) we will employ a dichotomous representation of progress toward a solution. A given communication intake will be classified merely as "contributing" or "not contributing" toward the solution, based (as mentioned above) on reported evaluations by the receivers of the communication.

Problem requires that a specific gap in knowledge exist in a research organization such as to cause management to assign to two or more professional researchers the responsibility and authority (within the usual budgetary and organizational limits) and the facilities to bridge this gap. In these restrictions lie the differentia between many so-called basic and applied research problems. It does not appear that the team or group approach, which depends on several professional workers and their supporting staff working in close cooperation (as evinced by the use of interpersonal communication) is currently used, or particularly adapted to work on questions of a more basic nature where the form of the answer is not readily specifiable in the statement of the problem. This hypothesis may be difficult to formulate in testable terms, but is important in such areas as basic nuclear and medical research.

Identification of the Available Communication Channels

The initial step in this procedure is a complete inventory of all communication media available to members of the group for exchange of information among themselves and between themselves and all persons and groups external to the problem-solving group. An expanded intuitive list of such media should include:

1. Two-way Oral and Gestural Communication in a face-to-face situation, such as a continuous working relationship, a meeting, a visit, an interview.
2. Two-way oral communication by means of a mechanical device such as a telephone, speaking tube, inter-com system. This can also include gestural communication via two-way television.
3. One-way oral and/or gestural communication by means of a mechanical device such as a tape recording, a public-address system, a motion picture. This medium does not generally allow for a sequential interchange of messages, but can allow for a delayed response.
4. Two-way written communication by means of letter, memo, or report which encompasses an interchange of such written material until a unit of communication has been completed. This involves the definition of "a communication unit" given below, which can involve an interchange of several messages.
5. One-way written communication by means of letter, memo, report, book, article, brochure, published charts and tables, etc. This medium does not allow for an interchange of messages.

In most research organizations, all of these media are available to all

of the professional workers to some degree. The crucial operation in identifying the communication media available to the group, then, is the classification of these media and their various forms according to relative availability. In order, however, that this classification be more than an abstract report of media available to each individual, sub-group, or the problem-solving group itself, this operation of availability determination must follow a definition and determination of channels of communication. Then will follow the identification of specific "media-channels," or individuals and groups linked by a particular medium.

Recent studies of communication patterns and information flow in human groups has reinforced the intuitive idea that not all of the members of a group are linked by channels of communication and that such links are not of equal utility in the transfer of information. In their studies of rumor transmission, for example, researchers at the Research Center for Group Dynamics (8) point out that

> "The likelihood that a given item of information circulating through a social structure will reach a particular individual is in part determined by the number and nature of the channels of communication in the structure that touch this individual."

A series of laboratory experiments by Bavelas (9) and his colleagues at M.I.T. has demonstrated some of the essentially different ways in which an organization of only five people can be linked by channels of communication, and the resulting differences in problem-solving productivity. Other demonstrations of this inequality of communicative opportunity are found in additional work by members of the Research Center for Group Dynamics (10, 11).

Of particular interest in this instance of communication within an ongoing group is Deutsch's (12) comment that

> ". . . what holds members of such groups together is their 'social cohesion,' or more accurately, their complementarity of communication, their ability to transmit relevant messages more accurately to each other than to anyone else".

Very briefly, a channel of communication, following from our specialized definition of information, is a link between a member or a sub-group, and other members, or sub-groups; or between a member, sub-group, or the problem-solving group as a whole and any external source of information through which information can be transferred.

Internal Channels

Group Member 1—Group Member 2
Group Members 1 and 2—Group Member 3

External Channels

Group Member 1—Laboratory Ass't.
The Whole Group—Research Director
Group Members 2 and 3—Another Company

The task of enumerating and evaluating all of the possible channels appears overwhelming in view of the number of possible internal channels alone that exist for a group of five. Kaphart (13) has developed a formulation for the total possible number of relationships (assuming that a relationship is the same in both directions) that can exist in a given group at a given time:

$$N = \frac{3^n - 2^{n+1} + 1}{2}$$

where n is the size of the group. For a group of five, therefore, the number of total possible channels of communication (if we disregard direction of flow) is ninety, including all possible links between members and sub-groups.

Fortunately, the most frequently encountered problem-solving groups in physical research organizations seldom have more than three or four members "directly engaged in the intake and utilization of information for the purpose of bringing the current problem to a conclusion."

A matrix method of portraying all of the internal relationships has been developed by Sachs (14), and it can readily be extended to describe all possible channels between the group and external sources of information.

Festinger (15) has proposed an analysis of this type of matrix involving a squaring of the original communication or sociometric matrix, such that

> "If the original sociometric data indicated channels of communication for information, the squared matrix would tell us who would hear things from whom with the information going through one intermediary."

This latter type of analysis, coupled with an identification of all the possible linkages or channels of communication within a system, offers promise of future understanding of the way in which information is brought to bear on the solution of a given problem in an on-going situation.

Following this inventory of the media of communication, and a representation of all possible communication channels, comes the classification of a "medium-channel"—a communication link using a specific medium—according to its availability to members of the group for exchange of information. Two criteria appear at this stage: a) the inclusive criterion of

availability, which accepts all communication channels and b) the exclusive criterion of exchange of information, which rejects all channels which can not or do not serve that purpose. As an initial specification of the availability criterion, it is proposed to use the empirical datum resulting from an answer to the question, "Has this channel ever been used?" For the latter criterion, the datum question is, "Has the group member ever received any information over it?" Use of both criteria rather than merely the latter is related to the problem discussed below under "reports by subjects as data." Subsequent classifications of the availability of a channel for exchange of information can take the form of a qualitative break-down such as, "Has been used: never, rarely, frequently, continually." Current field work, however, is employing numerical frequency classes over a given past period as measures of availability:

During the past month, show by check the approximate number of times you communicated with someone outside the company and the medium used:

	0	1-10	11-20	21-30	31-50	Over 50
Phoned someone						
Wrote someone						
Visited someone						

An additional consideration in the determination of the availability of media-channels is the concept of an individual's "propensity to communicate." Studies of group activity (3 or more people) and two-person activity involving a common member indicate that an individual's usage of a particular medium-channel or set of media-channels is dependent on three major factors:

1) His characteristic propensity to communicate as evinced by a person's reputation as "the gabby kind" or "a silent type"; Chapple and Lindeman (16) described a method several years ago for determining the "interaction rate" of mental patients for purposes of diagnosis. Chapple (17) has since used this method for selecting sales people and executives on the basis of their activity rates. A recent study of passenger complaints (18) involved the question of source and seriousness of complaints which depended on the phenomenon of cranks who complained just because they habitually complained.

2) The effect of his fellow group members on the individual's communicative activity. All of us have a range of roles that we play in the various groups to which we belong. Bateson and Ruesch (19) estimate that the number of such roles reaches a maximum of 20 to 25. Some people are dominant (in the interaction sense) in business, but fade into silence at home; others will communicate frequently with members of a group having common interests or characteristics. Homans (20) describes "isolates" (in the interaction sense) among file clerks

in a large utility company; further study indicates that these girls were different in some way from the other girls in the group.

3) The nature of the work has been shown to influence the communicative activity of group members. In a series of meetings of a plant suggestion committee (21), the activity rates of particular individuals correlated significantly with the nature of the suggestion being discussed. The sales and accounting department representatives hardly spoke during the discussions of highly technical suggestions, but the accounting representative in particular dominated discussions involving possible savings and costs.

Cognizance of these factors is important if the results of communication studies can lead to generalizations rather than mere reports of the behavior of particular individuals in specific situations. Cavanaugh (22) describes a method for predicting the rate of interaction between population centers, based on factors such as distance, size, and culture. Current research on the above-mentioned factors in interpersonal communication—individual propensity to communicate, group effect, nature of the task—may soon lead to a formulation for propensity to communicate within small groups and subsequent verification through field studies of on-going groups.

Measurement of the Utilization of Available Media-Channels

Essential to the measurement of information transfer (in the sense that we are discussing it) is a definition of the communication unit or the message unit in which such information is carried. Identification of this unit of flow is prerequisite to any measurements such as direction, frequency, or types and amounts of information transferred.

In the current studies of human interaction such as those of Bales (23, 24, 25, 26), Chapple (27), Arensberg (28), Whyte (29), Marquis-Heyns-Guetzkow (30), and Carter (31), two basically different definitions of the interaction or interpersonal communication unit are used. Perhaps the best expression of this basic difference is found in a recent letter from Bales to Arensberg:

> A single interaction in my terminology consists of a single act by a single individual or actor in a social or communication context, *as seen from the point of view of the other* . . . if person number 1 comes up to person number 2 and says, "Hello," . . . this constitutes a single interaction. . . . When person number 2 says, "Hello" in turn, this is another interaction. . . . As persons 1 and 2 continue to talk or communicate (by non-verbal as well as verbal means), we say that a "process of interaction" is going on, which is made up of many separable "interactions" . . . as I understand it, you would record a single sequential process of this sort, from beginning to end, as a single "interaction"

or "interaction event", and would characterize it in addition as having a duration of such and such a time.

The writer and his colleagues have used both methods in field work and are currently teaching them in the Industrial Engineering laboratory in Theory of Organization and Management. Our feeling is that it is not a matter of final choice between two rival methods, but, as Bales also points out in his letter, a matter of using the particular notation method best adapted to the field situation with which one is confronted. In one case (21) both methods were used side by side to measure the who-to-whom flow of communication in a series of committee meetings with excellent agreement between the methods.

In the current field situation, where the objective is the measurement of information transfer through a medium-channel, the latter (Arensberg) unit of flow is best adapted. The unit of flow or the communicative act then becomes *a continuous sequence of interpersonal communication with an observable or reportable beginning (initiation) and end (termination), which may or may not involve the transfer of information.* Illustrations of communication units follow, giving examples of potential or actual information transfer in two of the five media classes described above.

1. Two-way Oral, Face-to-Face:

   A turns to B and asks whether B knows of a compound with such and such properties. B replies that he does, and tells it to A. A thanks B and turns back to the work bench, with "some" information which will help him in solving the problem he is working on.

2. One-way Written:

   A visits the library to consult the original of an article which he has heard about. He reads the entire article, making notes, and returning to the lab once for some data to compare with that in the article. He finishes reading the article and returns to the lab.

Following the definition of the communication unit, it is necessary to provide a method for quantifying or otherwise classifying these units that will permit cumulation and other manipulation of units and, finally, the establishment of statistical hypotheses.

A statistical procedure currently used in industrial sampling inspection and census work provides a model that can handle the type of data with which we are now dealing. It is called "sampling for attributes" (32, 33); its most common usage involves the dichotomous classification of articles as "accepted-rejected, occupied-not occupied, zero-one, etc."

Following the conditions previously outlined we examine communication

units by some sampling scheme and classify each of the units in a sample as "containing" or "not-containing" information. The considerations governing such sampling are discussed below under *"statistical problems in sampling interpersonal activity"*.

This statistical procedure of sampling for attributes may eventually be expected to lead to statements analogous to the predictive statements made in the control of quality of manufactured product where, once a state of statistical control has been established, statements are made to the effect that: "with a stated risk of being in error, I expect that the number of defects in a random sample will not exceed a given number." A statement of this type in the present context would be: "With a stated risk of being in error, I predict that a random sample of communication-units flowing through a given medium-channel, during a given interval of time (a day, week, or month) will contain between x and y per cent information-bearing units."

While this kind of statement should prove invaluable to the control of communication once a state of statistical control—randomness in the source of the data—is known to exist, another type of statement is of more immediate importance to the evaluation of media-channels as suppliers of information to the problem-solving group. This type of statement involves the testing of statistical hypotheses such as:

> Medium-channel 1 is a better source of information to the research worker than medium-channel 2 in terms of a difference between comparable statistics of samples taken from each medium-channel.

Another type of statement involves an estimate of a population parameter such as the fraction of information-bearing communication units flowing through a medium-channel "MC" during a time period "t".

A final set of operations essential to the measurement of channel utilization involves the establishment of logical categories for each of the observable or reportable variables describing a communicative act or a series of such acts. Such operations might classify:

Initiation. A primary classification might be "internal-external" for a given medium-channel, but the field situation might require a larger number of classes, such as:

Internal Initiation (from within the group)	*External Initiation (from outside the group)*
Self-initiated	Self-initiated
Routine	Routine
Requested from outside the group	Requested from the group

Such classification might be indicated where a management decision to stimulate or inhibit a particular medium-channel depends on how communication-units are initiated in such media-channels.

Collection of Data in the Field—General Methodological Considerations

Data Collection Methods and Categories

Observation of human group behavior has proceeded along two major methodological lines. One group of social scientists and students of group relationships have either become part of an on-going organization for a sufficient period of time to become accepted members of the group they were studying (e.g. 34) or found themselves members of a group which had a problem warranting concurrent or subsequent analysis (e.g. 35). Moreno, in a recent symposium on social psychology (36), indicated that in order to successfully study the small group, the investigator must become a participant; he must act with the group. By its nature, this research procedure can yield data on one, perhaps a few organizations, in a limited period. The material gathered is necessarily "case study" in nature and provides, in some instances, an opportunity for deep insight into the group mechanisms which is often lacking in the data of a superficial survey. On the other hand, this type of situation provides little opportunity for the type of generalization offered by data gathered from a number of organizations with similar functions or structures—the type of data supplied by a sampling survey of specific characteristics or situations in many groups.

The other general method, currently employed by industrial sociologists and management research organizations, might be characterized as the "hit-and-run" survey procedure. The investigator usually enters the organization for the first time in response to a request for help on a particular problem or in order to gather data on a problem that he has phrased in support of theoretical or previous empirical work. This latter approach thus depends much more heavily on the investigator's techniques of data-gathering and recognizing important events and conditions than does the other general approach which permits the investigator to get the "feel" of the organization and to interpret events in the light of what he knows about it. This dependence on technique of data-gathering may be very well compensated for by the economies involved in the use of less expert observers. For example, a cultural anthropologist employing the "living-in" method of information-gathering is the product of many years of training and experience, whereas the observers most often employed in survey data-gathering

may have had little training and experience other than that necessary to enable them to employ the prescribed techniques.

Another source of economy in the use of the survey method is the smaller amount of time usually required to get a great deal of comparative information from many sources, thus providing a statistical, rather than a more expensive case-study base for the establishment and testing of hypotheses. The key to proper use of the method is, of course, the ability to phrase operational questions whose answers are comparable over a wide range of organizational situations. If the questions are not properly phrased *a priori,* detailed subsequent analysis will not provide the answers no matter how the data are sliced and cooked. The long-term case study on the other hand, is capable of yielding additional data continually during subsequent analysis, from the accumulated experience of the observer who has "filed away" many impressions during his term of living in.

In essence, resolution of this dilemma of methodological approach is often automatic and follows directly from the nature of the organizations studied and the objectives of the investigation. In the present instance, the question under consideration is, "How does information flow to the research worker?" The objective is to gain insight into the ways in which information actually does flow to the research worker in American research laboratories." The nature of the question is specific and the base of the data should be large (many organizations) in order to provide for summarization and generalization if regular patterns appear. The survey method has therefore been adopted with the added advantage that two members of the investigating group have had several years of experience in industrial research laboratories and can therefore bring a lot of impressionistic material to bear on design of the survey techniques.

The selection of survey techniques may prove to be the determining factor in the quality of data collected. A poor instrument—such as a questionnaire where one is not usable—may fail completely regardless of the clever wording of the questions. A recent survey field trip across the country by the writer and several associates (37) indicated that industrial organizations are becoming super-saturated with questionnaire surveys of all types and that the probability of successful institutional sampling by questionnaire in such places as factories, banks, insurance companies, and stores is rapidly decreasing. Interviewing—the other major cooperative technique—is being used with increasing frequency as a source of data in industrial situations, and although it too is being overworked as a technique, the resistance to it by interviewees appears to be decreasing as people

become more used to being quizzed and as their prestige continues to be built up by skilled interviewers.

Observation as a means of data-gathering in an on-going situation has not been exploited very much by investigators of group activity, although a great deal of attention has been attracted to the work of people like Chapple (17), Arensberg (28), Bavelas (9), Bales (23), Whyte (29), Carter (31), and the groups at the Survey Research Center and the Center for Group Dynamics in their experimental and empirical work in observing such things as interaction rates of individuals, group process in problem solving, group decision-making conferences, experimentally created communication nets, play groups, and union-management relations.

The limitations of observation as a data-gathering technique in on-going situations are formidable: it is costly, it changes the situation being observed, observers are difficult to train, the data is not as easy to handle as that of a check-off questionnaire (for example). The need for observation in many situations, however, far outweighs the objections to it and there are certain data that may not be secured in any other way than through direct observation by trained observers.

Where observation is used as a data-gathering method in survey work, two procedural problems arise: 1) how is the observation to be made and 2) how are the data to be recorded. The method of observation that is most widely used in laboratory studies of human behavior—observing a group through a one-way window, recording their verbal interactions, and in some cases taking motion pictures—is not practicable in most on-going situations. A second procedure—that of stationing observers in the work area—is much more flexible but may again be impractical where the work space is small and the subjects are constantly aware of the observers. Another variation of this second general method involves the movement of observers in the work area so that individual subjects are not being watched continuously. Both of these field methods depend on the observer "blending in with the wallpaper" after an initial disturbing period. Valid measures of the observer-effect on the subjects are difficult, since the observer has no way of knowing exactly how the subjects behaved before the observation period began. Observer reports over a long period, however, have indicated that a change in subject behavior is noticeable after a short orientation period and that the behavior appears to stabilize; the subjects appear to "forget that they are being observed" (21).

The current study, concerned with observations in various types of rooms—such as small laboratory offices and large open-area laboratory

rooms—is employing a variation of the moving observer method of observation. Due to the nature of the work being performed in the organizations under investigation and to the economies required in surveying a number of organizations at the same time, a sampling plan has been devised which allows an observer to enter a given organization at random times and observe communication activity for a short period, after which he leaves immediately. The theoretical considerations underlying this procedure are discussed below in "sampling human activity".

The second general procedural problem in the collection of data by observation involves the method of classifying the data as it is recorded. Numerous sets of categories have been developed within which to classify the content or the process represented by an interaction event. Bales (24) uses twelve categories; Staton (38) used fifteen; the Conference Research Group (30) used eleven; Carter et al. (31) used over fifty. The latter group indicates that:

> The major drawback is that as in most recording systems, the categories have to be carefully memorized, and some time is taken in learning the use of the machine (the stenotype interaction recorder) so that sufficient speed is achieved to follow fast group interaction.

The viewpoint of the writer and his colleagues is that perhaps no unique set of categories no matter how carefully developed and faithfully learned by observers can validly be used in situations whose natures are basically different, such as in a social group and in a decision-making conference. It may be that the question of validity of the observational methods being used to investigate group behavior is essentially independent of the specific categories employed and rests, instead, on the assumptions underlying the operation of describing interpersonal behavior in terms of observable communicative acts. A somewhat caustic passage from a recent editorial in a scientific journal indicates the nature of the major problem in observational techniques:

> Much of the energy that might have been turned profitably to improving the quality of observation in accordance with procedures used in the biological sciences and in chemistry and physics, has been directed toward the minute taxonomic dissection of verbalized intuitions which can be quantified and subjected to the soul-satisfying rituals of factor analysis.

But the usefulness of data gathered by observation (or any other way) sometimes stands or falls on the adequacy of the categories into which it is dropped in the heat of collection, and survey data particularly may turn

out to be useless as well as misleading if the collection categories are improperly designed.

Our view is that proper categories are of vital importance to the successful collection of this kind of data, but that categories must be designed according to the kind of situation under investigation. Specifically, an investigation which is undertaken for a particular purpose should include a set of meaningful questions (one or more) which can be phrased in operational terms (39). From such phrasing come the categories for data collection either directly from the wording of the questions—such as "who disagrees most often and with whom does he disagree"—or indirectly from the intent of the question. A classification illustrating this procedure has been developed for use in a series of studies in mass communication by Riley et al. (40). The question being asked is "What is the relation between our concept of group relationship and the behavior of group members with reference to mass media messages?" The categories used to classify this behavior are: Accepted, Rejected, or Distorted, a mass media message.

In the study of team research, the operational question being asked by the investigators is "From whom and by what means does information come to the research worker?" Issuing directly from this question is the set of categories being used:

This interpersonal communication unit

1. does contain
2. does not contain

information for the research worker.

A major theoretical problem in the use of observation (or any other of the means discussed) for gathering data on interpersonal communication is that of "correctness" of the data. Correctness implies more than the usual question of observer reliability; it includes also the question of validity of the data collected—validity in the sense of correspondence with the "facts".

Experiments in the graduate Laboratory of Organization and Management at Columbia indicate significant disagreement between reports of a large group of observers and several subjects under observation on the description of an individual subject's communicative behavior. For the moment, the best that can be done about assaying the "correctness" of the data is to depend on tests of reliability between observers and correspondence between reports by observers and reports by subjects for given data collection methods. Guetzkow (41) describes a method for testing the reliability of categorizing among several coders (observers). The resolution of the question of correctness of the data appears to lie at the present stage

of research in the specification of the crucial characteristic of the data as its usefulness in describing and testing hypotheses relative to the events under investigation.

Reports by Subjects as Data

Much of the work that has been done in describing or measuring interpersonal relationships has rested on the implicit assumption that reports of events by subjects correspond closely or exactly with the actual way in which the events occurred. If subject reports are the only source of data for determining what "really happened," there may be several uncontrolled and even unacknowledged sources of error in such a method:

1. One general source of error is the subject's perceptual slant or ability —his *einstellung* or set. His slant has been investigated by many students of intergroup prejudice by means of thematic apperception tests and other techniques for discovering the attitude of an individual toward cultures or groups different from his own. A recent study by Haire (42) describes the use of content analyses and projective techniques for probing the kind of roles that labor and management in a given plant perceive for each other. An attempt to reduce the effects of the halo effect in a sociometric test by putting each item on a separate page is reported by Goodacre (43), in a study of combat unit effectiveness.

Perceptual ability is known to vary and much has been said about it. The reports of a given event witnessed by several observationally untrained subjects have often been found to bear little resemblance to each other.

2. A second general source of error is the subject's failure to remember just what did happen. Assuming that he received a fairly reliable impression of an event at the time that it happened, it has been indicated by experiments in recall and by the experience of all of us that it generally becomes more difficult with passage of time to describe the details of an event as we originally perceived it. A great deal has been said on this matter in relation to the reliability of witness reports weeks or months after the occurrence of the event they have witnessed. The writer recently participated as a subject in a study of communications in a university department (44), and recalls the difficulty he had in summarizing at the end of each day all the contacts he had made and their subject matter. Stogdill (45) reports on a group of naval officers who were asked to name the other officers with whom they spent the most working time. These results were compared with logs kept by the same subjects on the time they spent with other officers in working contacts for a three-day period (not identical, but overlapping the period covered by the sociometric question). The correlation of estimated

time with logged time was —.31 for total mentions given and .74 for total mentions received. This comparison indicates that the data obtained by recall questions (e.g., what did you do last week or last month) may be subject to a heavy bias due to the inability of the person questioned to remember correctly. Flanagan (46), in describing his "critical incident" technique, indicates that the number of critical incidents reported by supervisors dropped sharply as the length of the reporting period was increased.

3. A third general source of error may be the reluctance of the subject, for whatever reason, to report his "true" impression of what occurred. This condition has been encountered often in organizational studies where subjects have been found to distort descriptions of events or interpersonal relationships for fear of retaliation, desire to let sleeping dogs lie, or a general reluctance to verbalize a particular type of situation or event.

4. Assuming that all of these sources of error have been acknowledged and accounted for, there is a fourth and overriding source of error which is usually explicit in rigorously designed and executed investigations—the inability of the subject to communicate his report to the investigator; or conversely, the inability of the investigator to get from the subject through whatever techniques (interview, questionnaire, etc.) the report that the subject is willing and able to give.

Exton (47) points out the mistake often made in asking questions or using concepts whose meanings change radically in the different context of the on-going situation.

In view of the vast amount of survey work employing subjective reports currently under way in industrial and other organizations, it might be wise to pay close attention to the matter of accuracy in reporting by subjects. A number of the recent studies of leadership have depended rather heavily on subjective reports to provide data on what a leader does and whom he contacts most frequently. Shartle (48) has used interview and questionnaire forms for this purpose, and Browne (49) used a sociometric type interview. Carter (31), on the other hand, has developed a procedure which includes observations as a data base, supplemented by other subject-report tools.

The writer recently participated in a field study with a management consulting organization (50) which employed a combination of interview and observation to describe the operations of a gun crew.

The current study of interpersonal communication in research laboratories is employing, in the test stage, a questionnaire, an interview, and a random sampling of interpersonal communication involving members of two research teams, including their assistants and group leaders. Preliminary

analysis of the questionnaire data reveal a significant lack of agreement in several instances between individuals with respect to their mutual communication experience over a specified period. For example, A reports that he eats lunch with B and C. B's response confirms this, but C does not mention A among the people he eats lunch with. The interview, following the questionnaire administration, revealed that the lack of agreement in some cases was due to ambiguous wording of the question and in others was due to a failure to recall what actually took place during the period under investigation. The sampling of communication was carried on for five weeks; the specific sample times were fifteen-minute intervals selected randomly from each week. Two data-collection instruments were used: 1) the subjects filled in a form immediately following the end of the sample interval describing their activity during the interval, and 2) the investigator (in some cases a member of the project staff, in others an employee of the lab being studied) sketched the activity of the subjects at the moment he entered the laboratory to administer the sample-interval form.

Statistical Problems in the Sampling of Interpersonal Activity

If the techniques of sampling are to be used successfully in the investigation of interpersonal activity, the investigator must have some notion, if not high assurance, of what the data issuing from samples represent. If the sampling data indicate that A and B are in more frequent contact than A and C, the investigator should be able to say, with some implied or specific confidence that these results do, in fact, represent the situation he is attempting to describe. He must have some notion of "what the activity is like" if he is to devise a valid sampling scheme. He must be aware of whether there is a universe within which he is sampling, and he must have some knowledge of the nature of that universe before he can devise a sample intelligently. Hertz and Littauer (51) point out the necessity for a preliminary observation period of several days to determine the pattern of activity—to ascertain whether there is enough regularity in the activity being studied to warrant the use of some type of sampling procedure. Coleman (21) describes a plan for stratified sampling of the communication among the salaried personnel of several departments in a manufacturing company, provided that interview and observation data indicated that the activity did in fact divide into regular periods which repeated daily.

Additional statistical problems include the usual ones encountered in sample construction: selection of sample size (in this case the sample size might be in minutes or in number of completed communicative acts); specification of the way in which sample intervals are to be selected (use of a table

of random numbers, or an arbitrary designation of intervals); establishment and testing of hypotheses; presentation of the sample data so that changes in the universe can be detected and appropriate redesign of sampling methods can be initiated promptly; calculation of sample statistics to be used in the testing of hypotheses; etc.

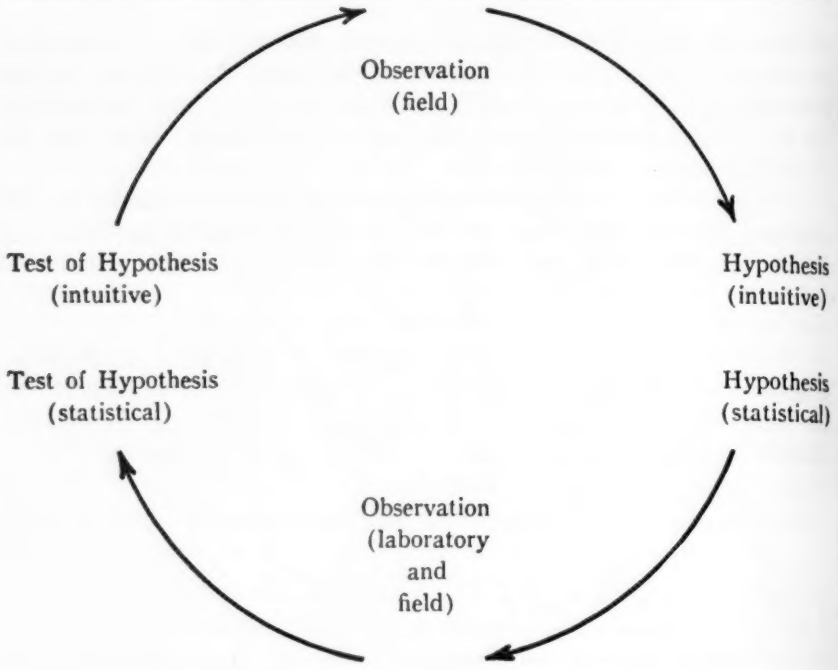
Close attention to statistical detail, however, must come second to the empirical determination of whether the events being observed are of such a nature that they can be adequately investigated by sampling.

Summary

Field studies of interpersonal communications in on-going situations are beset with most of the problems of experimental work on this subject in the laboratory, and several more. Among these additional problems and the common problems which often prove more complex in the field are:

Identification of the group to be studied
Identification of the channels of communication available to the group members
Measurement of the utilization of these channels
Establishment and testing of hypotheses
Selection of the techniques to be used for data collection
Construction of categories within which data are to be classified
Assessment of the correctness of the data
Consideration of the errors involved in using reports by subjects as data
Statistical problems in sampling interpersonal activity

Despite the number and nature of the problems encountered in measuring interpersonal communication in the field the writer firmly believes that the refinement of methodology and the collection of useful data must depend increasingly on well-designed, rigorously conducted, and *reproducible* studies in on-going situations. Although the armchair and the laboratory are indispensable to successful study of this type of activity, useful theory can only be built on a wide circular base:



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HOW KURT LEWIN'S "RESEARCH CENTER FOR GROUP DYNAMICS" STARTED

A Secession from the Sociometric Movement

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The similarities between Kurt Lewin's work in action and group research and my own has been so striking that many have wondered what kind of interdependence there is between Lewin and myself. Moreover, many of Lewin's students have also been my students, writing articles published in SOCIOMETRY and *Sociatry* since 1938, on subjects with which I have been widely identified, sociometric methods, dynamics of group structure, sociodrama and roleplaying, psychodrama and roletraining, etc. After I had initiated them they began to write similar articles for other journals and in books, having the stamp of my thought. In consequence, group dynamics, the name which was frequently used by them, as a label covering their common interests, was considered by interested observers as a branch of the sociometric movement. My obvious support, linked with my silence may have encouraged such a view.

I have frequently been bombarded with questions about this. An illustration is the query of a French psychologist, Roger Girod, in a book on the current situation of the social sciences in the United States. "On peut distinguer au moins deux courants principaux au sein de la microsociologie americaine: un courant sociometrique dont l'animateur est Moreno et un courant—d'inspiration lewinienne surtout—oriente vers l'etude de la dynamique des groupes, plus particulierment des groupes dont les members sont en rapports direct les uns avec les autres ou ont en commun un projet d'action precis. *Ces deux courants presentent de nombreux points communs et de nombreuses similitudes. Ils se developpent en etroite liaison mutuelle.*"* (Italics mine) "'One can distinguish at least two principal currents in the center of American microsociology: a sociometric current, of which Moreno is the driving force and a current—primarily of Lewinian origin—focussed upon the study of group dynamics, more particularly upon groups of which the members are in direct contact with one another or have a specific action project in common. *These two currents have many points in common and present numerous similarities. They are developing in close mutual relationship.*" (Italics mine)

* Roger Girod, *Attitudes Collectives et Relations Humaines*, Tendances actuelles des sciences socials americaines, Presses Universitaires de France, Paris, 1953.

Many an idea is started by two or more individuals independently. But this is not a case of duplicity of ideas. It can be shown on the basis of printed records that the leading associates of group dynamics have been in close contact with me. Their's is not a problem of productivity, their's is a problem of *interpersonal ethics*. In the case of duplicity of ideas the carriers do not know one another, they work in different places. But the imitators sit near the one from whom they steal the eggs, they are parasites. I did not harbor ill feelings towards them, this is the reason why I remained silent. I said to myself: Just as there are people who can have no children, so there are people who cannot create any ideas, therefore they adopt them. What matters is whether they fulfill their obligation and bring them up well. It is unfortunate—and this is why I am breaking my silence now —that these students of group dynamics have not only published distorted versions of my ideas and techniques, but they are practicing them on actual people in socalled research and training laboratories.*

The first question which I shall try to clarify here is: Did I influence Lewin's ideas and methods, and where and how did this take place? It should be clear that when I talk about ideas and methods I refer exclusively to group theory and group methods, action theory and action practice, that is, only to the work which Lewin had begun to do since about 1936, soon after the time that he had met me, and not to his work in Gestalt and topological psychology prior to that time.

Kurt Lewin met me for the first time early in 1935, and during that year we had several meetings. As Dr. Alfred Marrow, an intimate friend and student of Lewin's reports in the Obituary to Lewin in SOCIOMETRY, Volume 10, 1937, "I recall the day when I first introduced Dr. Lewin to Dr. Moreno. Both recent arrivals here, they had known of each other, but had never met. It was not long after the publication of Moreno's *Who Shall Survive?* and of Lewin's *Dynamic Theory of Personality*. Both men quickly found common ground." He was acquainted with sociometry and with some of the work I had done in Europe, especially das Stegreiftheater, and had read *Who Shall Survive?* Up to that time Lewin's publications did not deal with either group or action dynamics.** For better or worse, my

* The Research Center for Group Dynamics, Massachusetts Institute of Technology; the National Training Laboratory, Bethel, Maine; the Research Center for Group Dynamics, University of Michigan, Ann Arbor.

** See Bibliography in Ronald Lippitt's "Kurt Lewin, 1890-1947, Adventures in the Exploration of Interdependence," SOCIOMETRY, Vol. 10, 1947, pp. 87-97.

pioneering status in this field was already established and so I became the model for his first efforts in this for him new direction of research. He expressed in our talks particular interest in the democratic structure of groups, in contrast to their laissez faire and authoritative structure, problems with which I experimented at that time; it happened that my report on this topic in "Advances of Sociometric Techniques" appeared in the same issue of the *Sociometric Review* (February, 1936) in which he announced the carrying on of sociometric research at the Child Welfare Research Station at the University of Iowa. His first report of this study was subsequently published, two years later, in SOCIOMETRY, Volume 1, No. 3-4, 1938. A careful reader of my publications,* up to that time who knew also of my direct, face to face contact with Lewin, must have gained the impression that he was a student of my work and under my influence, that he tried to combine his concepts and experiences in Gestalt and topological psychology with the new acquisitions. As the matter stood by 1938, I was in the circles which were interested in the new developments of action and group theory, the acknowledged leader.**

It should also be clear that I strictly separate Kurt Lewin from the group of students who attended my workshops in Beacon and in New York in the course of the last ten years. I am inclined to believe that Lewin himself was rather naive as to their astute and Machiavellian practices, especially as these tactics did not show their true face until after his death. The journal SOCIOMETRY (and its companion journal *Sociatry* later called *Group Psychotherapy*) became one of the chief organs in which appeared a large number of articles dealing with experiments in group and action methods. Indeed, these articles on psychodrama, roleplaying, sociodrama and other sociometric techniques, by Ronald Lippitt, Alvin Zander, John R. P. French, Alex Bavelas, Leland P. Bradford, Paul Sheats, Margaret Barron, Kenneth D. Benne and others, differed little, if any, in theoretical position, description of techniques and hypotheses to be tested, from those of any other workers more closely identified with sociometry. Increasingly, I

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* *Das Stegreiftheater*, 1923; *The Group Method*, 1932; *Psychological Organization of Groups in the Community*, 1933; *Who Shall Survive?*, 1934; "Advances of Sociometric Techniques," 1936; "Interpersonal Therapy and the Psychopathology of Interpersonal Relations," 1937; "The Place of Sociometry Among the Social Sciences," 1937; "Sociometric Statistics of Social Configurations," 1938.

** For more extensive treatment of Kurt Lewin's dependence and debt to sociometry and the sociometric movement see *Who Shall Suvive?*, revised edition, Beacon House, 1953, "Preludes to the Sociometric Movement."

suppose, the temptation came over them to play different games on both sides of the fence, on one to appear as students of Lewin, on the other as students of Moreno, by printing the same or similar articles in the context of various publications. It was a shrewd device to plant, at least in the mind of *some* people, the idea that by sheer coincidence of circumstances the same ideas have developed independently. By using also a technique of quoting only each other, that is, those who belong to their clique, and not quoting any of my close associates or myself their double game became the laughing stock of connoisseurs and the initiated in this new form of "interdependence."

However, because of gentle pressure, the editors of a recent collection of their publications, Kenneth D. Benne and Bozidar Muntyan made a special acknowledgment, giving me full credit for having originated the ideas with which they were preoccupied, in *Human Relations in Curriculum Change,* published by the Dryden Press, New York, 1951: "The editors make special acknowledgment to Dr. J. L. Moreno, who has pioneered in the areas currently referred to as psychodrama, sociodrama, role-playing, action dynamics, warming-up technique, group psychotherapy and sociometry, and who first introduced these terms into the literature, with some of the meanings emphasized in the present volume. To a great extent, the basic impetus for certain new trends in group and action research can be traced to the work of Moreno and his numerous associates."

The other day I was reading old protocols* of psychodramatic sessions which are now in preparation for a special volume. Among them were some of the transcripts in which these men were participating as students and protagonists before they began to write on the subject and organize workshops of their own. I still see the bright boys sitting in my classes and role-playing on the psychodramatic stages of Beacon and New York.

* Two of these protocols are contained in *Group Psychotherapy,* Vol. 5, 1-3, 1952.

ANNOUNCEMENTS

Moreno Institute Program, 1952-1953

The Moreno Institute is chartered by the Board of Regents of the State of New York as a non-profit institution offering post-graduate courses of instruction in sociometry, sociodrama, psychodrama, group psychotherapy.

Faculty

J. L. Moreno, M.D., Director; Robert Boguslaw, M.A., Educational Director; Edgar F. Borgatta, Ph.D.; Gerhard Schauer, M.D.; Nahum Shoobs, M.A.; Lewis Yablonsky, M.A.; Zerka T. Moreno.

Guest Lecturers: Helen H. Jennings, Ph.D.; B. W. Aginsky, Ph.D.; Henry J. Meyer, Ph.D.; Ordway Tead, LL.D.; Jacob Greenberg, Ph.D.; Joseph I. Meiers, M.D.; Henry A. Murray, M.D.; Leonard S. Cottrell, Ph.D.; Margaret Mead, Ph.D.; Lewis Mumford, Ph.D.

Registration for Spring Semester, New York Institute, 101 Park Avenue, Feb. 2-6, 4:00-9:00 p.m.; opening of Spring Semester, Feb. 9, 1953.

Beacon Workshop Program: Washington's Birthday, Feb. 21-23; Easter, April 4-6; Memorial Weekend, May 30-June 1; Independence Day, July 4-6; Labor Day, September 5-7.

An accelerated program offering clinical facilities and lecture demonstrations on a seminar basis. Students participate in clinical practice sessions, group discussions and research projects.

Each Workshop takes place at 259 Wolcott Avenue, Beacon, New York and begins at 3:00 p.m. on the first day. Room and board are included in the enrollment fee. Enrollment should be completed at least one week in advance of each conference.

Beacon Resident Training Program: July 1-September 7. An extended training program in the clinical application of sociometry, psychodrama, sociodrama, and group psychotherapy methods. This program is designed to prepare the student for professional work in the field, and is conducted under the personal direction of J. L. Moreno, M.D.

For further details, write to: Moreno Institute, Beacon, New York.

Annual Meeting, American Society of Group Psychotherapy and Psychodrama

This meeting is scheduled to be held in Los Angeles, May 4-6, at the Hotel Statler; programs will be sent out as soon as ready.

Group Psychotherapy, Official Organ of the American Society of Group Psychotherapy and Psychodrama

From the Table of Contents of Volume 5:

"Applications of Psychoanalysis in Group Psychotherapy and Psychodrama in France"—S. Lebovici, M.D. and Associates.

"Sociometric Network in an Acute Psychiatric Ward"—R. Hyde, M.D. and Associates.

"Role Playing as a Method of Academic Education"—Leopold von Wiese.

"Psychodrama in Private Practice"—Robert S. Drews, M.D.

"Sociodrama of a Family Conflict"—J. L. Moreno, M.D.

"Sociodramatic Approach to Minority Problems"—J. L. Moreno, M.D.

"Psychodrama Group Psychotherapy and the Role Behavior of Schizophrenic Patients"—Gertrude S. Harrow

"Group Psychotherapy, A Control Study"—Howard Newburger, etc.